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Understanding Public Perceptions About Beach Nesting Shorebirds And Habitat Management On Cape Cod, Massachusetts

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UNDERSTANDING PUBLIC PERCEPTIONS ABOUT BEACH NESTING SHOREBIRDS AND HABITAT MANAGEMENT ON CAPE COD, MASSACHUSETTS

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by
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ABSTRACT

Coastline habitats along the eastern seaboard of North America serve as prime locations for beachfront development and consumptive and non-consumptive recreational opportunities. Many of these areas are also globally important nesting and wintering areas for threatened and endangered shorebirds (primarily species belonging to the order Charadriiformes). Across the span of their hemispheric ranges, shorebirds face significant threats due to increases habitat loss, human disturbance, and illegal hunting practices. With coastline use increasing human-wildlife interactions, positive public input and interaction is needed to mitigate negative consequences to wildlife. Although many techniques have been employed to discourage beach users from practicing recreational activities that cause disturbance and potential harm to beach-nesting shorebirds, these birds still experience disturbance from human activities on coastal shorelines. To date there is limited information available on public understanding, perceived value, and support regarding the management and protection of beach-nesting shorebirds. The study herein was conducted to assess public knowledge and perception about beach nesting shorebirds and the management of their habitats. Using a random purposeful sample, we surveyed 100 individuals on six Cape Cod, Massachusetts beaches during the summer months (May – September) of 2013, using a mixed methods approach for qualitative and quantitative data collection. The results demonstrated that beach-users on Cape Cod are aware of and support the need for shorebird protection, with the most significant relationship existing between the beach-users' feelings regarding beach closures and the protection of beaches for shorebirds. However, these results indicate

current signage used to manage beach-users in beach-nesting shorebird habitats on Cape Cod, is not an effective tool for communicating management of shorebirds and management of shorebird breeding habitat. Additionally, the results demonstrated that three factors (lack of knowledge, co-existence, and inconvenience/self-interest) influenced individuals' values toward shorebird conservation and management. The majority of respondents lacked knowledge regarding beach nesting shorebirds and their need for management due to two factors: ignorance about the role of the management agency in managing shorebirds and their habitat, and the management agency's negative image among beach-users. Aside from this lack of knowledge, the need for coexistence by beach – users, and the inconvenience/self-interest experienced by beach-users influenced the respondent's perception regarding the management and protection of beach nesting shorebirds and their habitat. These factors affect the perceptions and attitudes of beach-users, which ultimately effects the protection and management of beach nesting shorebirds on Cape Cod. With an increase in understanding and appreciation of shorebirds through education strategies, these factors could influence or change the perception of shorebird conservation on Cape Cod.

DEDICATION

I dedicate this work to my loving parents, Thomas and Valerie Hamilton, for their continual support, motivation, and groceries.

ACKNOWLEDGMENTS

I am a firm believer of "to whom much is given, much is expected." Although this dissertation journey has been a long and treacherous one, it is one that I have not had to travel alone. I would first like to say "thank you" to Dr. J. Drew Lanham (committee chair) and his family for providing a nurturing environment for me to grow, mature, and most importantly believe in myself again. Likewise, I would like to thank Dr. Brad Andres, Dr. Betty Baldwin, Dr. Shari Rodriquez, and Dr. Greg Yarrow for providing guidance, research design, data analysis and encouragement. I would like to thank my family and friends for all your love, support, and encouragement. I am most grateful to my "aunt" Deborah for opening up her home for me and my dog Mr. Jones during my summers on the Cape, which allowed me to conduct my research.

Additionally, I would like to thank Clemson University, the SREB – State Doctoral Scholars Program, and the U.S. Fish and Wildlife Service (Pathways Program and Monomoy National Wildlife Refuge) for providing an opportunity and gracious funding to conduct this research. I also would like to thank Dr. Billy Bridges for providing data analysis. Finally, I say thank you to my "village," who have provided consistent encouragement and support throughout the process, for which I am appreciative and grateful.

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CHAPTER ONE

INTRODUCTION

Problem Statement

Coastal areas represent 9% of the land area in the United States and provide birds with important habitats throughout their annual cycles. Along the western Atlantic Flyway that ranges from the Canadian Maritimes to the region surrounding the Gulf of Mexico, migrating shorebirds face significant threats due to increases in habitat loss, human disturbance, and illegal and unsustainable hunting. As human populations increase, human-wildlife conflicts also increase (North American Bird Conservation Initiative, U.S. Committee, 2013; Ottema & Spaans, 2008; United States Fish and Wildlife Service, 2010).

Annually, more than 180 million Americans visit coastlines for recreation and vacation purposes (North American Bird Conservation Initiative, U.S. Committee, 2013). With these increases in coastal area visitation and increased pressure to develop natural landscapes along shorelines, there has been increased input in protecting shorebirds on beaches, because of pressure on breeding grounds. Despite these efforts, shorebird populations have continued to decline (Andres et al., 2012; S. Brown, Hickey, Harrington, & Gill, 2001; Morrison et al., 2001).

Shorebirds contribute to the overall health of coastal ecosystems. The presence of these species (i.e., Piping Plovers-*Charadrius melodus,* American Oystercatcher-*Haematopus palliates*) on coastal habitat is a good indicator of the health of the environment. Research shows that 80% of shorebird species have shown negative

population trends (Morrison et al., 2001). Specifically, beach-nesting shorebirds (BNS) have declined drastically. American Oystercatchers have experienced a 21% decline, while Piping Plovers have experienced a 6% decline[1]. Snowy Plovers (*C. nivosus*) appear to be stable and Wilson's Plovers (*C.s wilsonia wilsonia*) have shown a declining population trend, but both species lack population trend information to confirm these recent population trends (Andres et al., 2012; Morrison et al., 2001; Sanders, Murphy, Spinks, & Coker, 2008; United States Fish and Wildlife Service, 2010). Each of the BNS are of conservation concern on the western Atlantic Flyway due to significant modification and disturbance of beaches by human recreational activities. Most BNS nest on open beaches, where they lay eggs in shallow scrapes in the sand. The nests and chicks are so well camouflaged that they can be and are accidentally trampled by unsuspecting beachgoers (North American Bird Conservation Initiative, U.S. Committee, 2013).

Shorebirds migrate to and through many countries throughout their annual cycle, where there are different levels of conservation and management. Recent findings show that there are varying values along the Atlantic Flyway regarding shorebird conservation and management. The variations in values towards wildlife resources can be examined through Kellert's typology of nine attitudes towards wildlife and the natural world which describes values and meanings people attach to the environment (Kellert, 1984). A person's basic values towards wildlife (shorebirds) may influence their attitude about specific species (Kellert, 1997). For example, on Cape Hatteras in North Carolina there

[1] Andres et. al (2012), reported that Piping Plovers are showing increasing to stable populations trends on the western Atlantic Flyway, but recovery goals have not been met for this listed endangered species.

has been human-wildlife conflict regarding the management of off-road vehicles (ORV) use and the protection of BNS that caused legal actions to be taken against that management agency (T. Williams, 2012). While in Florida, there have been numerous campaigns that involve the community in shorebird conservation and management (i.e. "Be a good egg campaign[2]") (Florida shorebird alliance.July, 2014). The Caribbean on the other hand, has a long history of shorebird hunting, starting before the early 1900s (Cott, 1953; Hutt, 1991). In 1907, the Wild Bird Protection Act was passed in Barbados to protect birds from declining population numbers, and in 1992, the United States passed the Wild Bird Conservation Act to encourage wild bird conservation in other countries. Research conducted by Ottema and Spaans (2008), cited hunting as the prominent threat to shorebirds in Suriname and the Guianas. Conservation efforts to stop declines of shorebirds have led to the development of new regulations that are addressed on both local and regional scales.

However, many shorebird species are still threatened by poaching as research continues to show that there is legal and unsustainable hunting of some breeding North American shorebirds on the southern end of the Atlantic Flyway (Dr.Brad Andres, Meredith Gutowski, Dr. Ines Serrano, personal communication, April 2012); Guadeloupe, Martinique, Barbados, Suriname, and French Guiana have been identified as crucial conservation points along the western hemispheric shorebird flyway where hunting continues to have significant negative impacts (Dr. Brad Andres, Meredith

[2]"Be a good egg" is an initiative created by North Carolina Audubon to raise awareness regarding beach nesting shorebirds, which focuses on educating people about how they can help protect coastal waterbirds. States such as Florida, New York, and New Jersey have started the campaign within their respective states to encourage beach-users to do their part in helping to protect shorebirds.

Gutowski, Dr. Ines Serrano personal communication, April, 2012; Ottema and Spaans 2008(Hutt, 1991). Even though there are significant threats towards shorebirds in these countries, they provide important stopover and wintering habitat along the Atlantic Flyway for shorebirds. With shorebird conservation varying from site to site, the management of shorebirds can be quite complicated and could lead to confusion and conflict regarding conservation and management of shorebirds from resource users (Petrosillo, Zurlini, Corlianò, Zaccarelli, & Dadamo, 2007; Teel, Bright, Manfredo, & Brooks, 2006).

Given that many shorebirds cross international borders in order to reach their breeding and wintering grounds, the issues surrounding negative population impacts and practices aimed at conserving those same populations are complex. Shorebirds typically stay five months or less at their breeding sites with rest of their annual migration spent at stopover and wintering areas. While stopover and wintering areas are important for shorebirds throughout their annual cycle, there is important legislation (i.e., Endangered Species Act) within the United States that is aimed at protecting them on their breeding grounds. Breeding sites are protected to ensure growth within the species' population. As shorebird conservation and management strategies are developed further, new regulations will be developed for shorebirds in their wintering areas (Comprehensive Conservation Planning Meeting, personal communication, April 14-15, 2011; Shorebird Conservation Strategies, personal communication, April, 2012). However, if the public is resistant to the rules and regulations that have been enacted for shorebird breeding

grounds, then, regardless of what is happening in the wintering and stop over sites, shorebird populations will decline.

Extensive public outcry has occurred over the management and protection of BNS because of beach closures for nesting shorebirds. For example, some residents of and vacationers to Cape Cod, MA dislike beach closures or the recreational restrictions imposed during the summer months (May–August) for shorebird protection. This seems especially true when residents and visitors must pay for beach access[3] (U.S. Fish and Wildlife Service Meeting, personal communication, April, 13, 2011; Comprehensive Conservation Planning Meeting, personal communication, April 14-15, 2011; Comprehensive Conservation Plan Issues Workbook, personal communication, May 4, 2011). The local communities' dissatisfaction with policies regarding shorebird protection engendered anti-conservation sentiments (e.g. "Plovers taste like chicken" bumper stickers) and angry rants directed at field personnel involved with shorebird conservation and management (U.S. Fish and Wildlife Service field personnel, personal communications). For those beaches that have nesting shorebirds, signs are posted to inform visitors and residents to avoid nesting sites, respect posted areas, and keep dogs leashed (some beaches do not allow any dog access during the summer). Furthermore, meetings are held to inform the public of issues and management practices for these species (U.S. Fish and Wildlife Service Meeting, personal communication, April, 13,

[3] Beach access on Cape Cod requires the purchase of seasonal beach stickers (permit) for residents and non-residents for each of the Cape's townships. Many residents purchase seasonal beach stickers within the township they reside, because of proximity of the beach and cost of the permit. While non – residents may purchase seasonal stickers for the Cape Cod National Seashore and/or for the township they are vacationing in. Non – resident stickers are more expensive than resident stickers and daily access passes will cost between $15 to $20 daily depending on whether it is a weekday, weekend, or holiday.

2011). While recovery and comprehensive conservation plans present solutions to protect vulnerable wildlife resources, these management plans have tended to neglect social values and community involvement, which has caused some individuals to disregard the rules and regulations, set by the municipalities to protect beach nesting shorebirds from human disturbance. To prevent more shorebirds from being listed as threatened or endangered, management policies increased regulations towards human disturbance by limiting public beach access to maintain the delicate, ever-changing habitat along the eastern shoreline of the United States. This includes restricting access to popular beaching areas, limiting tourist sites, and closing ORV areas that surround shorebird breeding grounds (Comprehensive Conservation Planning Meeting, personal communication, April 14-15, 2011; Comprehensive Conservation Plan Issues Workbook, personal communication, May 4, 2011).

Social support is important in recovery efforts for threatened and endangered species (Baldwin & Judd, 2010; Foster et al., 2003; Metrick & Weitzman, 1996). Research suggests that protecting flora and fauna requires active participation from individuals and society at large (A. Brown & McLachlan, 2002; McShane et al., 2011; Taylor, 2010). Understanding why people support or oppose specific management methods is important to provide management objectives that are socially acceptable and effective (Dandy et al., 2012; Ormsby & Forys, 2010). This type of management requires numerous stakeholders to adopt behaviors that are in the interest of the wildlife, such as temporary beach closures (Weston, Dodge, Bunce, Nimmo, & Miller, 2012), the elimination of illegal hunting, and the development of leash laws and dog exclusions (K.

Williams, Weston, Henry, & Maguire, 2009). The ability to generate effective and socially acceptable management programs will also depend on the management agencies understanding of the environmental interests, desires, and perceptions of the local community (Kellert, 1984).

Conflict between a local population and wildlife sometimes results in local people feeling that the conservation and management of the resource (shorebirds) is given priority over the needs of the community (Madden, 2004; Maguire, Rimmer, & Weston, 2013; Peterson, Peterson, Peterson, & Leong, 2013). Perceptions are influenced by their past experiences, beliefs, and values. Challenges arise when management decisions are made with assumption that there will be high and generally voluntary compliance of stakeholders (Ormsby & Forys, 2010; Reed, 2008). For example, temporary beach closures, regulatory distances from plover exclosures, and leash laws work if beach users are willing to abide by these sets of rules and change their usual beach-recreational behaviors. However an issue arises when local communities become distrustful towards government entities (Davenport, Leahy, Anderson, & Jakes, 2007). Frequently, individuals most involved in the management agency's process do not believe the agency will act in an ethical manner, and there are no considerations on how the decision could affect the community (Smith, Leahy, Anderson, and Davenport, 2013). This type of negative attitude towards government entities can be found throughout the Cape Cod community wherein beach-users ignore the rules as a way of showing their opposition to

shorebird conservation and management actions because of the U.S. Fish and Wildlife Services failed management plan in 1996[4].

In a New York Times article titled "Gulls are Cast as Threat to Avian Neighbors; Agency is Cast in a Bad Light" (Rimmer, 1996) highlights how the Cape Cod community rallied behind an adopted "mascot" of Cape Cod and the islands: the gulls. This article and many other national and local newspapers addressed the lack of involvement by the Cape Cod community in making the management decisions for shorebird conservation. Anti-conservation sentiments were exacerbated because many community members felt that the events that unfolded were decisions solely made by the federal government. Additionally, the article reports on how management agencies disagree on the best methods for conserving shorebirds (Rimmer, 1996). When a variety of stakeholders are involved with the conservation decisions of a declining species, a high amount of involvement can cause management issues, but it can also bring new governances, participation, and sustainable objectives (Teel & Manfredo, 2009).

In 2011, the U.S. Fish and Wildlife Service began devising a conservation plan for shorebirds along the Atlantic Flyway in order to conserve declining species. This plan is a collaborative attempt to create a cohesive conservation strategy that can be implemented successfully to insure a future for shorebirds. Due to the expanse of the Atlantic Flyway, these conservation strategies are aimed to adequately address threats and regulatory issues on a landscape scale. Since there has been an increase in recent

[4] In 1996 the service set out poison for more than 5,000 gulls to clear an area for nesting roseate terns, a threatened species, and piping plovers, classified as endangered. The program became a public relations nightmare for the service when dead and dying gulls were found in ponds and backyards on the mainland. This plan was developed to encourage shorebirds to nest on the refuge.

issues involving beach nesting shorebirds on Cape Cod (e.g., Piping Plovers and American Oystercatchers), this research aims to answer the U.S. Fish and Wildlife Service call for information on social values data related to BNS conservation on Cape Cod, MA.

Purpose Statement

The intent of this concurrent mixed methods study is to examine the public perception of beaches as shorebird habitat, the lack of public knowledge and the public's attitude about beach nesting shorebirds and their management. Specifically, this study examines the Cape Cod community and visitor populations' perceptions of beach closures for shorebird protection and how these perceptions have influenced the management and conservation efforts of the beach nesting shorebirds' breeding habitat on Cape Cod. Furthermore this study begins to address knowledge gaps regarding social values of shorebird conservation. The results to this research could help strengthen future management strategies and education programs regarding shorebird conservation along the Atlantic Flyway. Four objectives guide this research:

1.) To investigate the understanding of public attitudes towards beach nesting shorebirds.
2.) To examine the understanding of public attitudes towards beach closures
3.) To examine how public attitudes have been shaped through human-shorebird interactions

4.) To examine the level of public knowledge about shorebirds and the public perception of beach management for shorebirds.

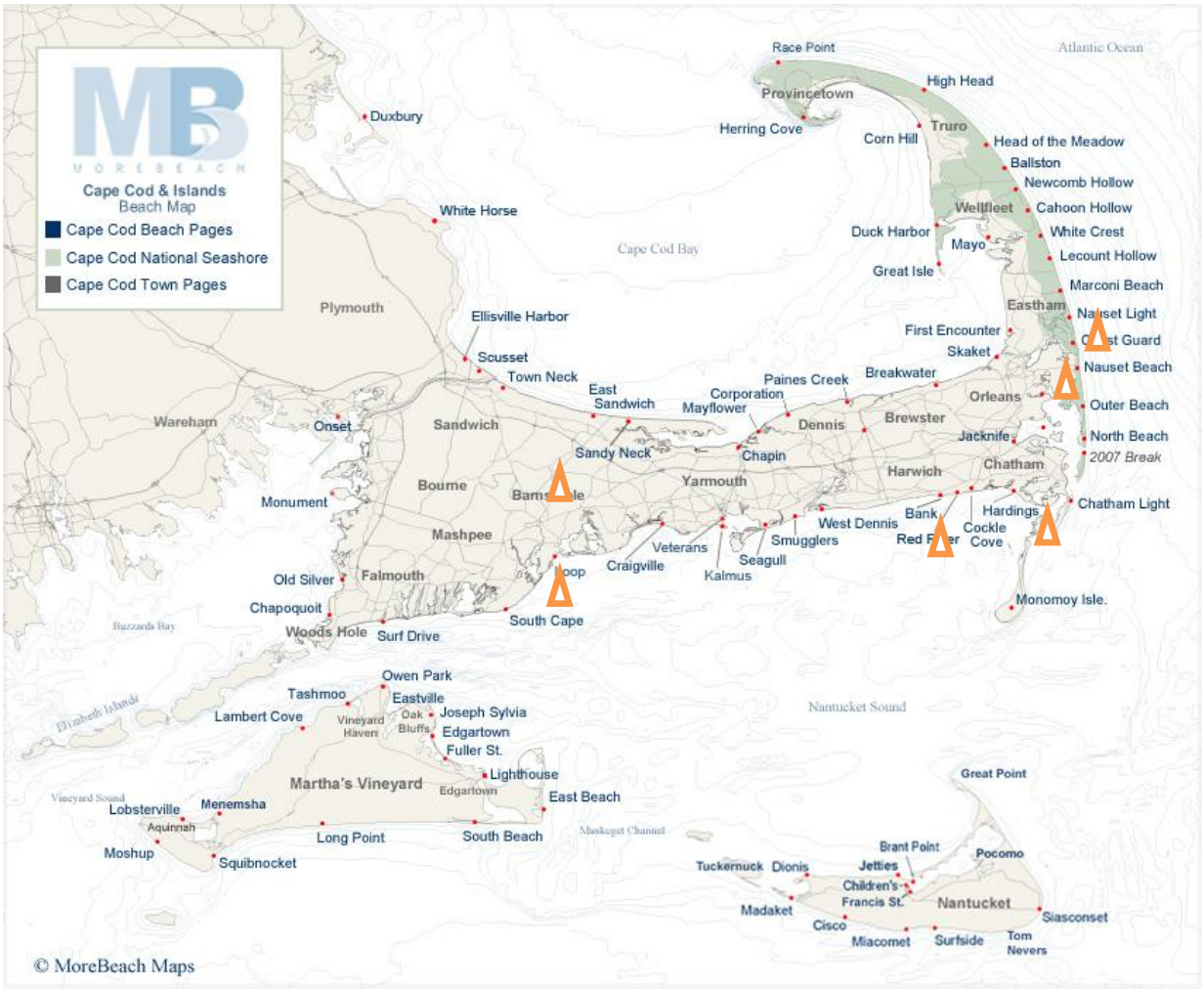
Research Sites

Cape Cod is a 1139.6 square kilometer island located on the easternmost portion of Massachusetts. Cape Cod stretches out into the Atlantic Ocean and is often described as the distinctive human-like arm extending from the Massachusetts mainland. One of the United States' biggest barrier islands, Cape Cod is divided into 4 sections, 15 towns, and numerous villages. The closest section to the mainland of Massachusetts is considered upper Cape, followed by mid, lower, and outer Cape Cod. On the outer portion of the Cape lies the Cape Cod National Seashore, which encompasses 181.30 square kilometers of National Park ecosystems created in 1961 by presidential decree. The Cape's climate is usually more moderate than inland locations and has a year-round population of 200,000, which grows to 600,000 during the summer months.

Cape Cod offers a variety of beach areas and serves as an important bird area for breeding shorebirds. Six distinct sites-varying in location, recreational activities, and different number of occurrences of beach users-were selected for this study: Sandyneck Beach, Craigville Beach, South Beach, Hardings Beach, Nauset Beach, and Coastguard Beach (Figure 1.1). All six study sites are breeding grounds for BNS – only the American Oystercatcher and Piping Plover are known to breed on Cape Cod. Two of the selected sites are very popular among ORV users. Located on the bayside of upper Cape Cod, Sandyneck Beach is recognized by the state of Massachusetts as a site of "critical

environmental concern", yet ORV usage is permitted on this beach during the BNS breeding season (May-August). Craigville Beach, located in the mid Cape area on Nantucket Sound, was selected due to its popularity as a family beach area. In lower Cape Cod, South Beach and Hardings Beach were selected due to their proximity to Monomoy National Wildlife Refuge. These beaches are frequented most within this section of Cape Cod and Hardings Beach allows beach racking (removal of wrack from the shoreline). South Beach was once connected to South Monomoy Island (an island part of the national wildlife refuge) before a 2013 nor'easter storm, which allowed beach-users to walk onto U.S. Fish and Wildlife Service refuge areas. On outer Cape, Nauset Beach and Coastguard Beach, both part of the National Seashore were selected as study sites. Nauset Beach permits ORVs.

Figure 1.1 Map of Cape Cod beach areas. The orange arrows designate the six sites selected for this study



Structure of the Document

The remainder of this dissertation is comprised of three chapters: two chapters formatted as journal manuscripts (chapters 2 and 3), a conclusions chapter (chapter 4), and a section for appendices and literature citations. Chapters 2 and 3 include an introduction, materials and methods, results and discussion, and conclusions. Chapter 2 investigates threatened and endangered species management on Cape Cod through the following research questions:

1.) Does the general public know the role the U.S. Fish and Wildlife Service have in managing shorebirds?

2.) Is there a lack of public support for beach closures for shorebirds protection?

Chapter 3 investigates the communication tools used to inform the public regarding shorebird management on Cape Cod through the following research questions:

1.) Is there a lack of knowledge about beach nesting shorebirds on Cape Cod?

2.) What are the factors that have influenced public perceptions and attitudes of beach nesting shorebirds on Cape Cod?

The third chapter also investigates the techniques used by the U.S. Fish and Wildlife Service to raise awareness and support of shorebird management and addresses the best message and medium when communicating to the public. Chapter 4 is conclusions of the findings from each chapter. This fourth chapter expands the discussion to include management implications and research limitations.

CHAPTER TWO

WHAT THE BEACH MEANS TO ME: PUBLIC PERCEPTION OF ENDANGERED SPECIES AND THEIR MANAGEMENT ON CAPE COD, MASSACHUSETTS

INTRODUCTION

Coastline habitats are prime areas for beachfront development and recreational opportunities (both consumptive and non-consumptive use) and are globally important nesting and wintering areas for a variety of protected species. Effective conservation and management is necessary on sandy shores as migrating shorebirds face significant threats from increases in habitat loss, human disturbance, and illegal and unsustainable hunting. With increases in human populations and increased pressure to develop and inhabit natural landscapes along coasts, there have been increased efforts to protect habitats and their associated avifauna (Miller & Hobbs, 2002). Despite increased efforts towards conservation and management, shorebird populations have consistently declined (Andres et al., 2012; S. Brown et al., 2001; Morrison et al., 2001). While temporary beach closures, improved regulations, and signs posted in breeding areas have been used to protect vulnerable wildlife resources, the decisions to use these methods have been made without the consideration of social values and public involvement (A. Brown & McLachlan, 2002).

Research suggests that recovery efforts for threatened and endangered species require active participation from people and management agencies (A. Brown & McLachlan, 2002; McShane et al., 2011; Metrick & Weitzman, 1996; Taylor, 2010). Understanding why people support or oppose specific management methods is important

to provide management objectives that are socially acceptable and effective (Dandy et al., 2012; Ormsby & Forys, 2010). This type of management requires numerous stakeholders to adopt behaviors that are in the interest of the wildlife, such as temporary beach closures (Weston et al., 2012), leash laws, and dog exclusions (K. Williams et al., 2009). Challenges usually arise when management decisions are made because management efforts rely on the high and generally voluntary compliance of stakeholders (Ormsby & Forys, 2010; Reed, 2008). Conservation often generates conflict because it challenges the values people have about the resource (Baldwin & Judd, 2010). Likewise, conflicts will vary from human-wildlife conflicts to human-human conflicts regarding wildlife (Madden, 2004; Peterson et al., 2013). This relationship can be examined even further through Kellert's typology of nine attitudes towards wildlife and the natural world which describes values and meanings people attach to the environment (Kellert, 1984). When a variety of stakeholders are involved in the conservation of a declining species, this amount of involvement can certainly cause issues; yet, it can also bring new governances, participations, and sustainable objectives.

There are many government agencies and non-profit organizations involved in the management and conservation of shorebirds. Likewise, many shorebirds cross international borders to reach their breeding and wintering grounds. In 2011, the U.S. Fish and Wildlife Service began devising a conservation plan for shorebirds along the western Atlantic Flyway- ranging from the Canadian Maritimes to the region surrounding the Gulf of Mexico. This plan is a call to action as well as a collaborative attempt to create a cohesive conservation strategy that can be implemented successfully in order to

insure a future for shorebirds. Due to the expanse of the Atlantic Flyway, conservation strategies must adequately address threats and regulatory issues on a landscape scale. This plan identifies public understanding, perceived value, and support as an important strategy. Therefore, this research aims to answer the U.S. Fish and Wildlife Service call for information on social values.

Since, there has been an increase in recent issues involving beach nesting shorebirds (Piping Plovers - *Charadrius melodus*) and American Oystercatchers - *Haematopus palliates*) on Cape Cod, information on public perceptions and knowledge regarding these birds was obtained from this study. The overall goals of this study is to assist the U.S. Fish and Wildlife by addressing knowledge gaps regarding social attitudes of shorebird conservation and management, examine beach users' perceptions of beach closures for shorebird protection, and determine how these perceptions have influenced the management and conservation efforts of the beach nesting shorebirds (BNS) breeding habitat on Cape Cod. Four objectives guided this research: investigate the understanding of public attitudes towards beach nesting shorebirds, examine the understanding of public attitudes towards beach closures, examine how public attitudes have been shaped through human-shorebird interactions, and examine the lack of public knowledge about shorebirds and the public perception of beaches.

MATERIALS AND METHODS

Study Area

Cape Cod is an 1139.6 square kilometer island of sand and gravel located on the easternmost portion of Massachusetts that stretches out into the Atlantic Ocean. One of the United States' biggest barrier islands, Cape Cod is divided into 4 sections, 15 towns, and many villages. The closest section to the mainland of Massachusetts is considered upper Cape, followed by mid, lower, and outer Cape Cod. On the outer portion of the Cape lies the Cape Cod National Seashore, which encompasses 181.30 square kilometers of National Park ecosystems created in 1961 by presidential decree. The Cape's climate is usually more moderate than inland locations and has a year-round population of 200,000, which grows to 600,000 during the summer months.

Cape Cod offers a variety of beach areas and serves as an important bird area for breeding shorebirds. Six distinct sites-varying in location, recreational activities, and different number of occurrences of beach users-were selected for this study: Sandyneck Beach, Craigville Beach, South Beach, Hardings Beach, Nauset Beach, and Coastguard Beach (Figure 1.1). All six study sites are breeding grounds for BNS – only the American Oystercatcher and Piping Plover are known to breed on Cape Cod. Two of the selected sites are very popular among off- road vehicle (ORV) users. Located on the bayside of upper Cape Cod, Sandyneck Beach is recognized by the state of Massachusetts as a site of "critical environmental concern", yet ORV usage is permitted on this beach during the BNS breeding season (May-August). Craigville Beach, located in the mid Cape area on Nantucket Sound, was selected due to its popularity as a family beach area.

In lower Cape Cod, South Beach and Hardings Beach were selected due to their proximity to Monomoy National Wildlife Refuge. These beaches are frequented most within this section of Cape Cod and Hardings Beach allows beach racking (removal of wrack from the shoreline). South Beach was once connected to South Monomoy Island (an island part of the national wildlife refuge) before a 2013 nor'easter storm, which allowed beach-users to walk onto U.S. Fish and Wildlife Service refuge areas. On outer Cape, Nauset Beach and Coastguard Beach, both part of the National Seashore were selected as study sites. Nauset Beach permits ORVs.

Sampling

We developed a questionnaire during spring 2013 that was designed to follow Irving Siedman, three part interviewing techniques designed to gain rapport and then build reflective thoughtful questions (Seidman, 2012). The method also allows for information on phenomena, with the ability to explore what the underlying meaning and causes are behind the scaled answers. The survey includes five sections. Section 1 focused on the general information of the participant, and included three Likert scaled questions and one open-ended question. Section 2 focused on beach use, and included three Likert scaled questions and one open-ended question. Section 3 focused on shorebirds, and included four Likert scaled questions and two open-ended questions. Section 4 focused on shorebird management, and included six Likert scaled questions and two open-ended questions. Section 5, the final section of the survey, focused on community involvement, and included one Likert scaled question and three open – ended

questions. We used a five point Likert-scale question which ranged from "strongly agree" to "strongly disagree." After the questionnaire was designed, it was reviewed by a statistician and an experienced qualitative researcher - then approved by the Clemson University's Institutional Review Board (IRB-#2012-104).

The surveys were implemented on weekends between May 2013 and September 2013 in order to target the influx of visitors to the Cape Cod area. A random, purposeful sample was used to select the participants for the study. Participants were chosen based on what part of the beach they used, which was an arbitrary division of the beach by the researcher. When surveys were implemented, the researcher arbitrarily divided the beach into three sections (family area, naturalist, and ORV) and randomly selected participants from each section to gain maximum variability.

Before each survey was given, a verbal script was read to each participant that identified the researcher and purpose for the study. No identifying information was collected during the survey, and each participant was distinguished by an alphanumeric code comprised of the participant's initials and age. While the survey was being conducted, the researcher used a field journal to record additional information about the participant's attitude and perception of beach nesting shorebird management that was not captured in the survey.

Analysis

Upon completion of data collection, data was entered into Microsoft Excel® and divided into quantitative (Likert-scaled questions) and qualitative (open-ended and additional comments) sections. For item non-response in the qualitative data, a N/A (no

answer) was marked and for the quantitative data item non-response was marked with "no response". Furthermore, if a participant's alphanumeric code was duplicated, an additional letter was added. Two independent researchers were given the qualitative data to conduct inter-rater reliability tests which measures agreement among all raters and helps to decrease bias within the data sets.

Data analysis was conducted in two phases. During the qualitative phase of the analysis, an overall description was written for each of the open-ended questions to gain an understanding of the participants' responses. Descriptive statistics for the quantitative data were calculated and quote matrices created (qualitative data - using (MAXQDA, 2014), which helped to develop themes through queries. The five point Likert scale responses were collapsed into three point Likert scales. For the quantitative data, inferential statistics (Chi-square tests) were calculated using (JMP®, 2007).

RESULTS AND DISCUSSION

A total of 100 surveys were completed during the course of this study. Our compliance rate was approximately 95%. Of those 100 responses, 41% were residents of Cape Cod, 38% were residents of Massachusetts other than the Cape Cod area, and 21% were residents out of the state. The majority of the respondents were in the age range of 46-55 (42%), followed by 22-35 year olds (31%). Nearly 80% of the respondents held at least a bachelor's degree (78%), while another 36% held graduate degrees.

Item non – response in our qualitative questions occurred wherein one participant completed the Likert scale questions, but chose not to complete the open-ended

questions. Three themes were identified throughout the data: co-existence, lack of knowledge, and inconvenience/self-interest. The theme co-existence described participants' need for balancing beach use with shorebird conservation. For lack of knowledge theme, participants described their lack of understanding regarding shorebird management, conservation, and importance. The final theme, inconvenience/self-interest, participants described the human nature of people and wanting to decrease shorebird management practices.

Co-existence

Participants acknowledged that birds were important to protect in the scope of the overall health of the ecosystem and that humans should change their habits because birds were inhabitants of the beach first. Participants indicated a need to balance protection of BNS and human needs, and that it was the U.S. Fish and Wildlife Services' role to balance protection and public use of ecosystems.

Lack of knowledge

Participants mentioned they do not know enough about the birds or their habitats and would like more information, education, and signage concerning the birds. Several, participants responded that many members of the public do not know enough about shorebirds and need more education. Others were apathetic: they thought that only certain species needed protection or that protecting habitats actually creates harms for bird populations because of the increased number of predators in those areas.

Participants mentioned wanting to know more about what the agency does and that they did not know the role of the U.S. Fish and Wildlife Service. A few mentioned that it was the agency's role to enforce state and federal regulations.

Inconvenience/self-interest

Participants responded that people wanted to have access to beaches for vacationing and recreational purposes. Many participants indicated that members of the public were generally selfish or did not care about the birds or the natural environment. Some participants indicated nesting areas/habitats, not entire beaches, should be closed for BNS breeding so as to minimize inconveniences to human recreational needs. Participants also mentioned that the U.S. Fish and Wildlife Service was going "overboard with protection" and stated that some species either did not need help or that the U.S. Fish and Wildlife Service was protecting non-native species. Other participants regarded the nature of closures were that there were either too many or they were not in the correct place.

There were some item non – responses in our quantitative questions wherein eleven participants completed the open-ended questions, but chose not to complete the Likert scale questions. Eighty-one percent of participants agreed that shorebirds are important to protect, followed by 11% of participants had no opinion (Figure 2.1). Participants' response to beach closures for shorebird nesting showed 51% agreed, and 37% of participants disagreed (Figure 2.2). When respondents were asked, "Should more beaches be protected for shorebirds," 58% agreed, and 23% had no opinion (Figure 2.3). Forty-five percent of participants had no opinion on the role the U.S. Fish and Wildlife

Service had in managing shorebirds, while 27% of participants agreed they knew the management agencies role (Figure 2.4). Furthermore, 49% of participants had no opinion regarding the U.S. Fish and Wildlife Services' image, followed by 41% of participants agreed that the USFWS has a positive image (Figure 2.5).

Chi-square tests indicated that there are correlations between two sets of questions. The first set of questions were "How do you feel about beach closures for shorebird nesting (Q1)" and "Should more beaches be protected for shorebirds (Q2)" ($X2=44.178$, $P<.0001$). An "agree" on Q1 led to a .7414 probability of an agreement on Q2 and an "agree" on Q2 led to a .8431 probability of an agreement on Q1 (Table 2.1). The second set of questions were "Do you know the role the U.S. Fish and Wildlife Service has in managing shorebirds (Q3)" and "The U.S. Fish and Wildlife Service has a positive image (Q4)."($X2=21.279$, $P<.0003$) An "agree" on Q3 led to a .6667 probability of an agreement on Q4 and a "disagree" on Q4 led to a .5000 probability of a disagreement on Q3 (Table 2.2).

The qualitative results show that there are three reoccurring themes regarding the perception of beach nesting shorebirds and their habitats. These themes were: (1) a lack of public knowledge and education of shorebird management, protection, and importance (2) the need for coexistence for successful shorebird management, and (3) public inconvenience and self-interests regarding increased beach closures. Furthermore, the results revealed that beach users are aware of the importance of shorebird protection. The quantitative results displayed significant relationships between beach closures and beach protection for shorebirds, and between the image of the management agency

Figure 2.1 Distribution table of how respondents responded to the question, "Shorebirds are important to protect?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.

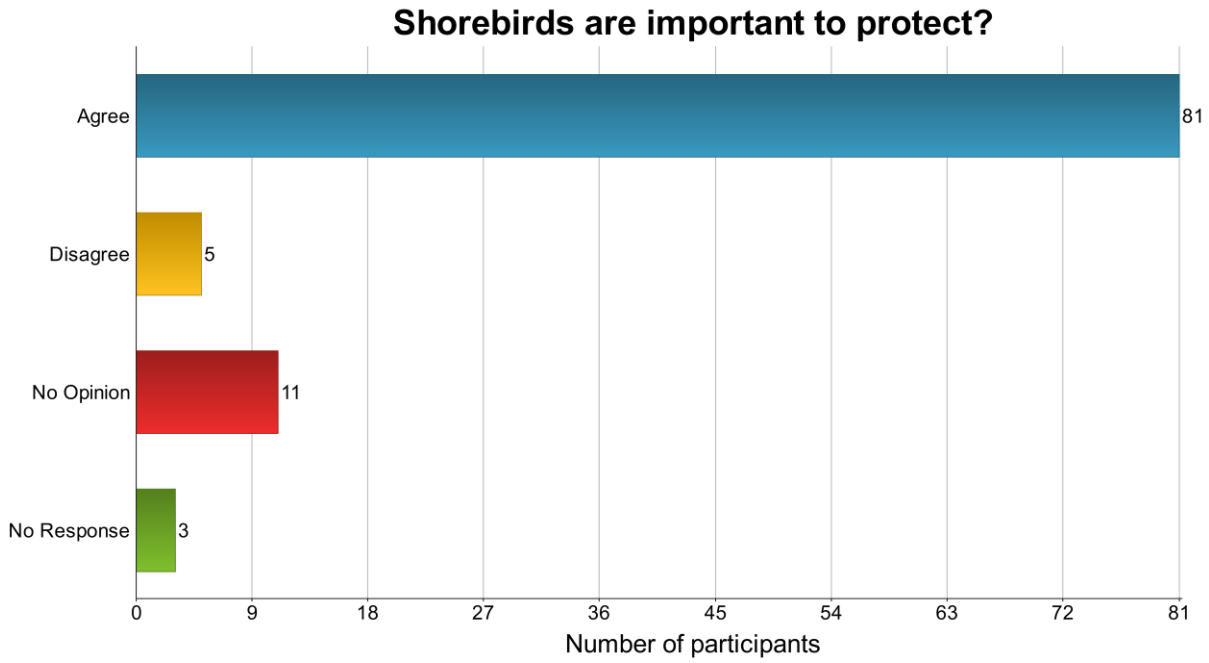


Figure 2.2 Distribution table of how respondents responded to the question, "How do you feel about beach closures for shorebird nesting?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.

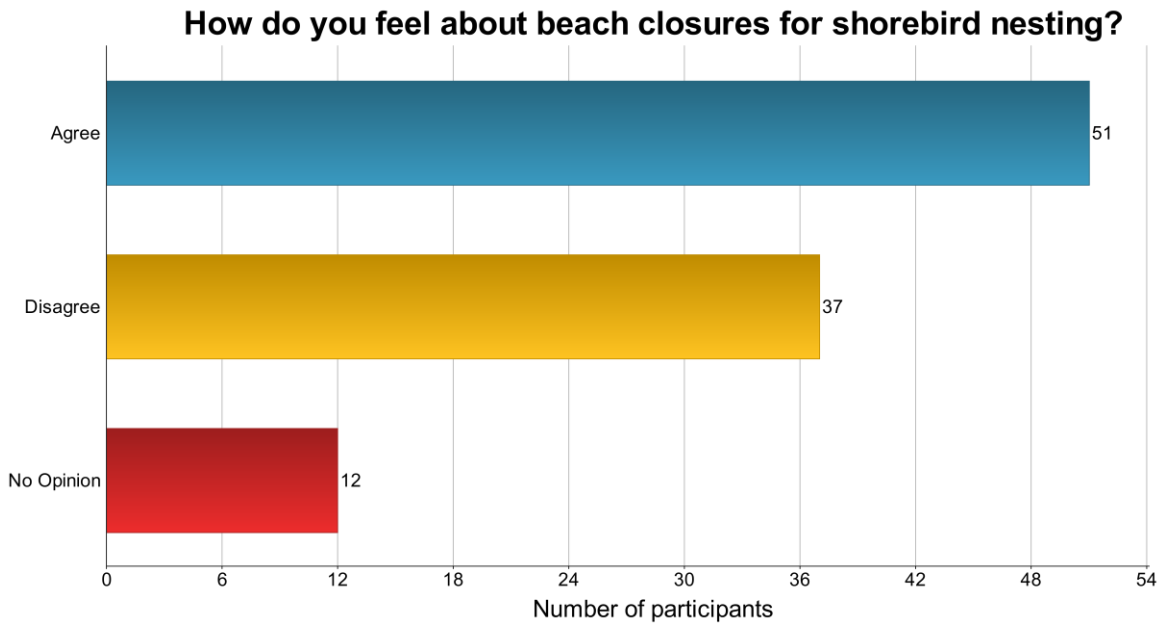


Figure 2.3 Distribution table of how respondents responded to the question, "Should more beaches be protected for shorebirds?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.

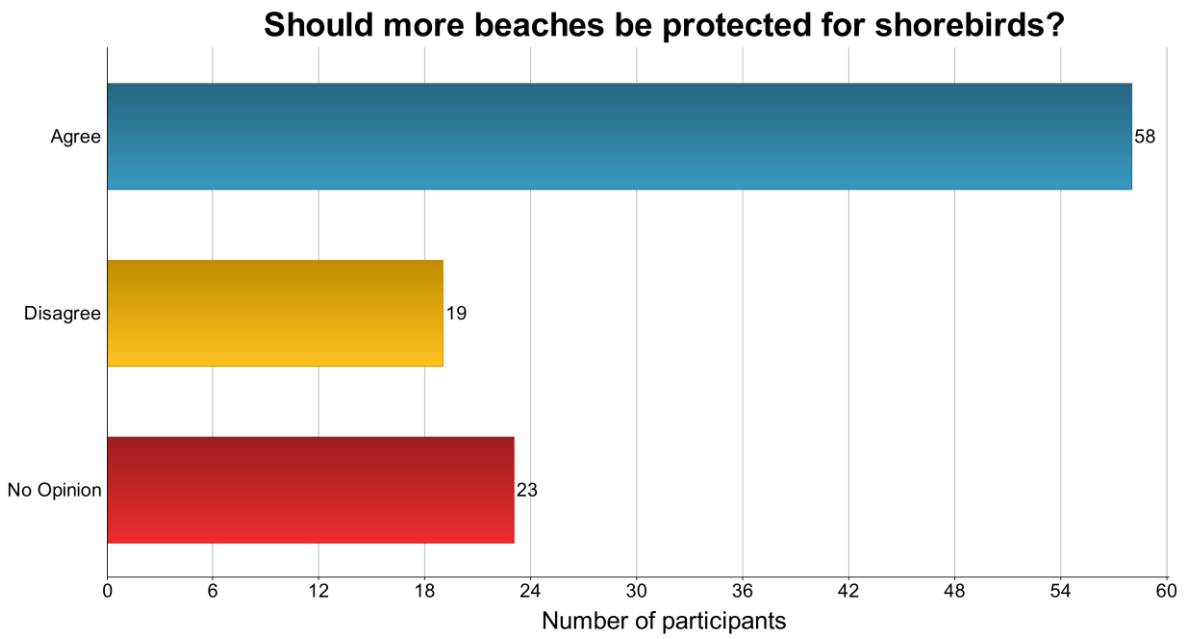
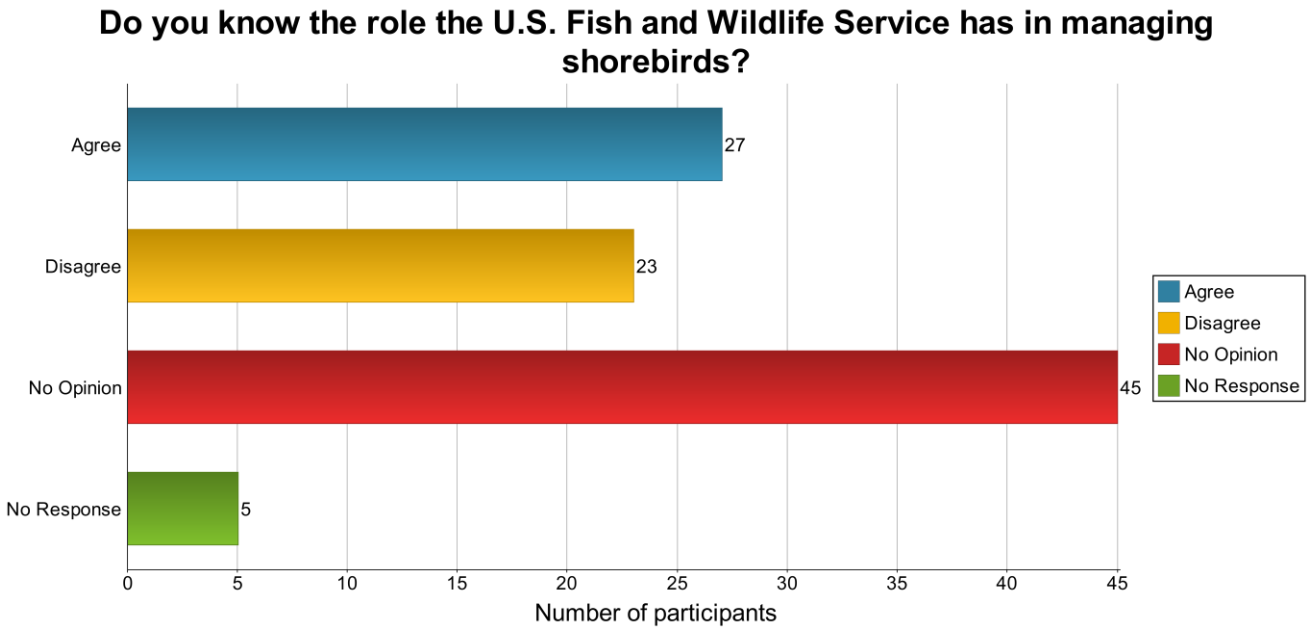


Figure 2.4 Distribution table of how respondents responded to the question, "Do you know the role the USFWS has in managing shorebirds?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.



(U.S. Fish and Wildlife Service) and their role in managing shorebirds. The most significant relationship existed between the beach users' feelings regarding beach closures and the protection of beaches for shorebirds. This relationship suggests that, if a beach user is in agreement with the protection of beaches for shorebirds, there is a 84% probability that they will support (e.g., adhere to regulations and management) beach closures for shorebird nesting. Additionally, there is a 74% probability of support if beach users are in agreement about beach closures for shorebirds. We also see within the results that there is a 50% probability that beach-users will not know the role the U.S. Fish and Wildlife Service has in shorebird management and conservation because of the image of the management agency, which will affect management practices on Cape Cod.

CONCLUSIONS

The findings in this research accomplish all of the objectives for this study. The frequency of the themes, co-existence, lack of knowledge, and inconvenience/self-interest, suggests that these are the attitudes that have influenced public perceptions about beach nesting shorebirds and the management of their habitats which has a direct effect on threatened and endangered species management. The ability to generate effective and socially acceptable management programs will depend on the management agencies understanding of the environmental interests, desires, and perceptions of the local community (Kellert, 1984). Participants of this research mentioned the need for co-existence on beaches. This suggests that beach users want humans and birds to successfully utilize the beach habitat at the same time. Outcomes like the aforementioned

Figure 2.5 Distribution table of how respondents responded to the statement, "The U.S. Fish and Wildlife Service has a positive image." On the x axis is the number of respondents and on the y axis is the response options to the Likert scaled question.

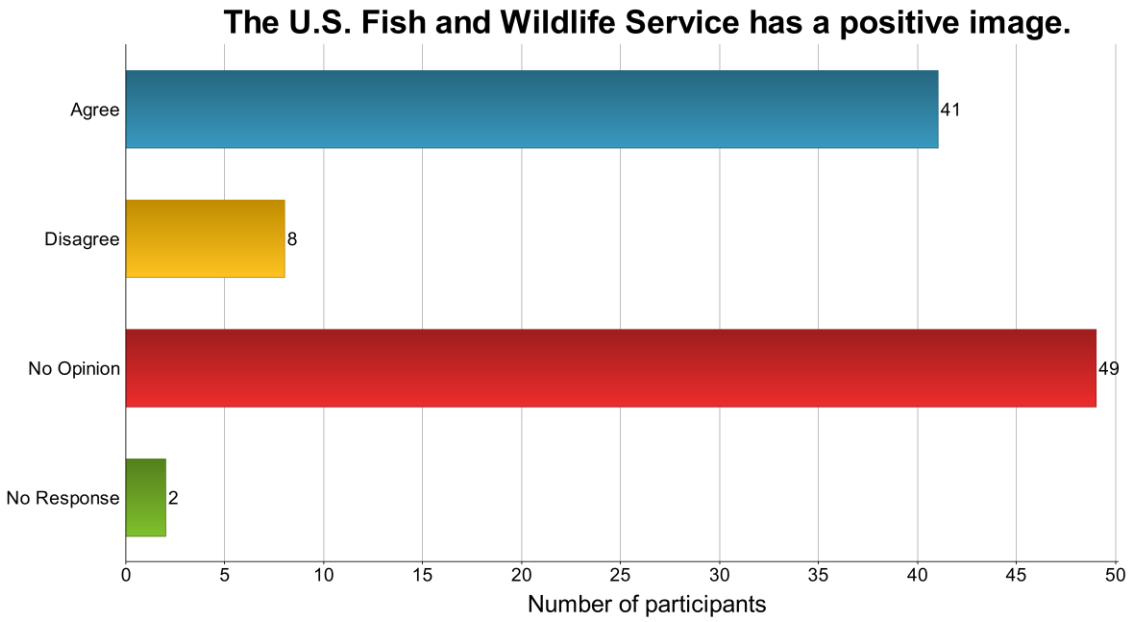


Table 2.1 Chi-square analysis of beach users' responses to beach protection and closure. The contingency table shows the probability of the respondent response to the given variables. Likelihood ratio was used for the analysis due to sample size.

Contingency Analysis of "How do you feel about beach closures for shorebird nesting?" By "Should more beaches be protected for shorebirds?"

Contingency Table

$Should more beaches be protected for	$How do you feel about beach closures for shorebird nesting?			
Count Total % Col % Row %	Agree	Disagree	No Opinion	
Agree	43 43.00 84.31 74.14	8 8.00 21.62 13.79	7 7.00 58.33 12.07	58 58.00
Disagree	3 3.00 5.88 15.79	16 16.00 43.24 84.21	0 0.00 0.00 0.00	19 19.00
No Opinion	5 5.00 9.80 21.74	13 13.00 35.14 56.52	5 5.00 41.67 21.74	23 23.00
	51 51.00	37 37.00	12 12.00	100

Tests

N	DF	-LogLike	RSquare (U)
100	4	22.089152	0.2287

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	44.178	<.0001*
Pearson	40.923	<.0001*

Table 2.2 Chi-square analysis of beach users' responses to the role of the U.S. Fish and Wildlife Service and their image. The contingency table shows the probability of the respondent response to the given variables. Likelihood ratio was used for the analysis due to sample size.

Contingency Analysis of "Do you know the role the USFWS has in managing shorebirds?" By "The U.S. Fish and Wildlife Service has a positive image."

Contingency Table

$The USFWS has a positive ima	$Do you know the role the USFWS has in managing shorebirds?			
Count Total % Col % Row %	Agree	Disagree	No Opinion	
Agree	18 19.35 66.67 46.15	3 3.23 13.04 7.69	18 19.35 41.86 46.15	39 41.94
Disagree	3 3.23 11.11 37.50	4 4.30 17.39 50.00	1 1.08 2.33 12.50	8 8.60
No Opinion	6 6.45 22.22 13.04	16 17.20 69.57 34.78	24 25.81 55.81 52.17	46 49.46
	27 29.03	23 24.73	43 46.24	93

Tests

N	DF	-LogLike	RSquare (U)
93	4	10.639748	0.1078

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	21.279	0.0003*
Pearson	19.029	0.0008*

could occur if beach users willingly modify their behaviors (Philip, Ruddock, & Bullman, 2008). This could be accomplished by leashing dogs while on the beach, keeping distance from breeding and staging birds, respecting posted areas, and decreasing the amount of ORV use during the summer months when beach nesting shorebirds are breeding. Many beach users would not comply with these guidelines because they do not understand the impact of their behaviors and the personal expectations of co-existence. Co-existence would require beach – users to avoid recreational activities that could cause disturbance to BNS nesting on the beach. Single disturbance occurrences may not have an immediate effect on a nesting shorebird, but the repeated occurrence of the disturbance is what causes harm to BNS and what beach – users do not understand regarding their impacts on BNS. As previously stated, the "Be a Good Egg" campaign created by NC Audubon promotes co-existence by encouraging beach – users to share the beach with BNS to decrease disturbance on nesting grounds.

Although the vast majority of the participants were educated at a college level or higher, lack of knowledge and education was identified as an attitude that influenced public perceptions of beach nesting shorebird and their habitats. Essentially, participants do not know what beach nesting shorebirds are even though they have been the forerunner in human-shorebird conflict issues. This may be due to the fact that some beach nesting shorebirds are small and well camouflaged in the sand and often go undetected by beach-users. Yet, this research did not determine if respondents new anything about American Oystercatchers. This species is a much larger, distinctively colored and easily recognized. Considered by some to be charismatic species, it might be

used to gain support for the conservation of species that are otherwise cryptic and difficult to gain public support for. (Barney, Mintzes, & Yen, 2005; Walpole & Leader-Williams, 2002). Charismatic species appeal to the public and generates sympathy and attention. Although shorebirds do not have an inherent conservation value based on appearance, widespread public support is more easily generated if they are "likeable" (Walpole & Leader-Williams, 2002). This ultimately influences beach-users' behaviors because the more knowledgeable local communities become regarding shorebird management, conservation, and importance it is less likely that these beach-users would engage in disruptive or potential harmful recreational behaviors (Barney et al., 2005).

Participants in this study had some connection to the beach, whether it was a meeting place for family and friends or a childhood vacationing spot. Regardless of their customs, participants frequented the beach as much as possible, and the attitude of inconvenience/self-interest could be due to beach traditions and locations that may have pre-dated shorebird management (Kollmuss & Agyeman, 2002). Conservation is often a social movement – the efforts put forth by management agencies to protect and conserve beach-nesting shorebirds is equal to the efforts of the local community to maintain memories of work and recreation that they have experienced on beaches (Baldwin & Judd, 2010). Many conservation and recovery plans for shorebirds emphasize biological assessments and solutions within multiple use areas. Perhaps this is because threatened and endangered species problems are the result of human actions (Kellert, 1985). Yet social support is important in the recovery of threatened and endangered species. The lack of a social component in management plans may be due to management agencies

inadequate assessment of the benefits local communities derive from these spaces and species (Kellert, 1985). Shorelines will continue to serve as ideal locations for development and recreation. Hardin's "Tragedy of the Commons" explains that resource held in common will invariable be over- exploited (Feeny, Berkes, McCay, & Acheson, 1990). A resource held in common is a resource that is not owned by anyone or a resource own by a group (i.e. public lands, national seashores, wildlife management areas – WMA, refuge areas). These areas usually allow for multiple uses and can be accessed by anyone. Overuse or ungoverned common resources often leads to problems where user self – interest lead to long term depredation of the resource to the disadvantage of everyone who benefits from the resource. However, by understanding the perceptions and attitudes of the local community, this could improve the efficiency of management practices and increase community support for management actions within common resources.

The culture in the United States is inclined to help threatened and endangered species (Cook & Cable, 1996). For example, the North American Wildlife Conservation Model (NAWCM) was developed after resource users realized they needed to protect diminishing wildlife and their associated habitat. The NAWCM is guided by seven sisters (guidelines) and two basic principles – fish and wildlife belong to everyone and these resources need to be managed for future generations. The NAWCM is unique and the backbone of conservation and management of resources in the United States. The quantitative results showed that beach-users value shorebird protection and conservation. However, we found that the image of the management agency affects the willingness of

beach-users to adhere to these rules and regulations of shorebird conservation. This is due to the local community not knowing the role the management agencies have in managing shorebird populations. Essentially, the local community is not going to support what they do not understand (Baldwin & Judd, 2010). If management agencies invest in social support this could lead to a long-term relationship between the authority and the local community. Smith et. al (2013) found that local communities most involved with the management agencies decisions and planning process have a distrust toward the agency, because they do not believe the agency will act in an ethical manner and there will be no considerations on how management decisions could affect the community. The beach-users' perceptions of increased support for beach closures and protection of shorebirds caused fear of losing access to public beaches. The loss of beach access can be a concern for those local communities whose livelihoods depend on coastal habitats. This perception and attitudes of the local community is the reason why there has been resistance towards the conservations of shorebirds (Baldwin & Judd, 2010).

Management agencies must understand that beaches are important for people as well as shorebirds. There needs to be considerations for the local communities values which can be built through a mutual respect and understanding of their lives (Baldwin & Judd, 2010; Kellert, 1985). Wherever there are human-shorebird interactions, there will exist varying factors that determine the compliance of the local community to adhere to regulations and rules set by management agencies. Determining these factors is important in influencing and changing beach users' behaviors and making them beneficial for shorebirds and people. Conservation will continue to be seen as an

obstacle by the local community if conservation is viewed as an act rather than a social movement.

ACKNOWLEDGEMENTS

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CHAPTER THREE

EFFECTIVNESS OF SIGNAGE AS A COMMUNICATION TOOL FOR MANAGING BEACH NESTING SHOREBIRDS

INTRODUCTION

Along the Atlantic Coast the increase in habitat loss and human disturbance in coastal areas is placing tremendous pressure on sandy beaches and poses conservation challenges to beach nesting shorebirds. There is increased conflict over protecting shorebirds in these areas, which has resulted in management techniques to discourage beach-users recreational impacts that cause disturbance and harm to beach nesting shorebirds. These techniques include direct and indirect management practices, such as: informational and educational programs, signs and brochures, and increasingly emphasized regulations and threats of fines. Direct management practices approach management with an emphasis on regulations of behavior and restrict unwanted activities, while indirect management practices try to influence desired behaviors through voluntary compliance (Hockett & Hall, 2007). Despite efforts to educate beach users on "appropriate" beach behavior, beach nesting shorebirds are still experiencing disturbance from human activities in many places (Ruhlen, Abbott, Stenzel, & Page, 2003). With that in mind, the question of where the message of conservation gets lost in translation is relevant.

Historically, signs have been used by agencies, for both direct and indirect management practices, to communicate the rules, regulations, and the role of the agency (Johnson, 1992). Specifically, signs are used to help manage beach-users while also

addressing a variety of recreational activities that are detrimental to beach nesting shorebirds (Park, Manning, Marion, Lawson, & Jacobi, 2008). However, some studies have shown that communication through signs is ineffective at affecting a beach user's knowledge and behavior (Hockett & Hall, 2007; Johnson, 1992; Park et al., 2008; Weston et al., 2012), while other research suggests that signs can reduce unwanted recreational activities if paired with another management practice (Johnson, 1992; Martin, 1992). Despite mixed findings regarding the effectiveness of signs, most of the research on this topic suggests that the inability of signs to grab the beach user's attention is one reason that signs have limited effectiveness. Attention can be defined as a process of concentrating on a particular aspect of the environment while ignoring others, and in many cases it is very selective. Park et al. (2008) found that the maximum amount of time that an individual spent reading a sign did not exceed eight seconds. In order for a sign to be an effective conveyor of an interpretive message, it must first catch the attention of the beach user while also prompting questions, confronting and correcting misconceptions, and challenging the reader to change his or her behavior (Bitgood, 2000).

Freeman Tilden (1957) defined interpretation as "an educational activity which aims to reveal meaning and relationships through the use of original objects by firsthand experience and by illustrative media rather than to simply communicate factual information." Tilden developed six principals that outlined the design of interpretation techniques to reveal meaning and evoke emotional and intellectual curiosity. An interpretive experience is trying to aid the participant from awareness, to concern, and

finally into actions that influence behavioral changes (Knapp, 1996). Ham and Krumpe (1996) found that site based interpretation strategies are important in achieving conservation objectives.

Currently on Cape Cod, signs are used to convey the rules and regulations of the U.S. Fish and Wildlife Service and indicate boundaries meant to protect beach nesting shorebirds. In general, the majority of beach users on Cape Cod have little to no understanding of the importance of the shorebirds and their habitats and thus are unaware "disturbing" recreational behaviors affect shorebird conservation and management. Many times beach users ignore or are not cognizant of the signs in nesting areas. The objectives of this study is to examine the lack of public knowledge about shorebirds and the public perception of beaches, examine how public attitudes have been shaped through human-shorebird interactions, and examine if current signage and information regarding beach nesting shorebirds are effective.

MATERIALS AND METHODS

Study area

Cape Cod is an 1139.6 square kilometer island of sand and gravel located on the easternmost portion of Massachusetts that stretches out into the Atlantic Ocean. One of the United States' biggest barrier islands, Cape Cod is divided into 4 sections, 15 towns, and many villages. The closest section to the mainland of Massachusetts is considered upper Cape, followed by mid, lower, and outer Cape Cod. On the outer portion of the Cape lies the Cape Cod National Seashore, which encompasses 181.30 square kilometers

of National Park ecosystems created in 1961 by presidential decree. The Cape's climate is usually more moderate than inland locations and has a year-round population of 200,000, which grows to 600,000 during the summer months.

Cape Cod offers a variety of beach areas and serves as an important bird area for breeding shorebirds. Six distinct sites-varying in location, recreational activities, and different number of occurrences of beach users-were selected for this study: Sandyneck Beach, Craigville Beach, South Beach, Hardings Beach, Nauset Beach, and Coastguard Beach (Figure 1.1). All six study sites are breeding grounds for BNS – only the American Oystercatcher and Piping Plover are known to breed on Cape Cod. Two of the selected sites are very popular among ORV users. Located on the bayside of upper Cape Cod, Sandyneck Beach is recognized by the state of Massachusetts as a site of "critical environmental concern", yet ORV usage is permitted on this beach during the BNS breeding season (May-August). Craigville Beach, located in the mid Cape area on Nantucket Sound, was selected due to its popularity as a family beach area. In lower Cape Cod, South Beach and Hardings Beach were selected due to their proximity to Monomoy National Wildlife Refuge. These beaches are frequented most within this section of Cape Cod and Hardings Beach allows beach racking (removal of wrack from the shoreline). South Beach was once connected to South Monomoy Island (an island part of the national wildlife refuge) before a 2013 nor'easter storm, which allowed beach-users to walk onto U.S. Fish and Wildlife Service refuge areas. On outer Cape, Nauset Beach and Coastguard Beach, both part of the National Seashore were selected as study sites. Nauset Beach permits ORVs.

Sampling

We developed a questionnaire during spring 2013 that was designed to follow Irving Siedman, three part interviewing techniques designed to gain rapport and then build reflective thoughtful questions (Seidman, 2012). The method also allows for information on phenomena, with the ability to explore what the underlying meaning and causes are behind the scaled answers. The survey includes five sections. Section 1 focused on the general information of the participant, and included three Likert scaled questions and one open-ended question. Section 2 focused on beach use, and included three Likert scaled questions and one open-ended question. Section 3 focused on shorebirds, and included four Likert scaled questions and two open-ended questions. Section 4 focused on shorebird management, and included six Likert scaled questions and two open-ended questions. Section 5, the final section of the survey, focused on community involvement, and included one Likert scaled question and three open – ended questions. We used a five point Likert-scale question which ranged from "strongly agree" to "strongly disagree." After the questionnaire was designed, it was reviewed by a statistician and an experienced qualitative researcher - then approved by the Clemson University's Institutional Review Board (IRB-#2012-104).

The surveys were implemented on weekends between May 2013 and September 2013 in order to target the influx of visitors to the Cape Cod area. A random, purposeful sample was used to select the participants for the study. Participants were chosen based on what part of the beach they used, which was an arbitrary division of the beach by the researcher. When surveys were implemented, the researcher arbitrarily divided the beach

into three sections (family area, naturalist, and ORV) and randomly selected participants from each section to gain maximum variability.

Before each survey was given, a verbal script was read to each participant that identified the researcher and purpose for the study. No identifying information was collected during the survey, and each participant was distinguished by an alphanumeric code comprised of the participant's initials and age. While the survey was being conducted, the researcher used a field journal to record additional information about the participant's attitude and perception of beach nesting shorebird management that was not captured in the survey.

Analysis

Upon completion of data collection, data was entered into Microsoft Excel® and divided into quantitative (Likert-scaled questions) and qualitative (open-ended and additional comments) sections. For item non-response in the qualitative data, a N/A (no answer) was marked and for the quantitative data item non-response was marked with "no response". Furthermore, if a participant's alphanumeric code was duplicated, an additional letter was added. Two independent researchers were given the qualitative data to conduct inter-rater reliability tests which measures agreement among all raters and helps to decrease bias within the data sets.

Data analysis was conducted in two phases. During the qualitative phase of the analysis, an overall description was written for each of the open-ended questions to gain an understanding of the participants' responses. Descriptive statistics for the quantitative

data were calculated and quote matrices created (qualitative data - using (MAXQDA, 2014), which helped to develop themes through queries. The five point Likert scale responses were collapsed into three point Likert scales. For the quantitative data, inferential statistics (Chi-square tests) were calculated using (JMP®, 2007).

RESULTS AND DISCUSSION

A total of 100 surveys were completed during the course of this study. Our compliance rate was approximately 95%. Of those 100 responses, 41% were residents of Cape Cod, 38% were residents of Massachusetts other than the Cape Cod area, and 21% were residents out of the state. The majority of the respondents were in the age range of 46-55 (42%), followed by 22-35 year olds (31%). Nearly 80% of the respondents held at least a bachelor's degree (78%), while another 36% held graduate degrees.

Item non – response in our qualitative questions occurred, wherein only one participant completed the Likert scale questions, but chose not to complete the open-ended questions. Three themes were identified throughout the data, co-existence, lack of knowledge, and inconvenience/self-interest. The theme co-existence described participants' need for balancing beach use with shorebird conservation. For lack of knowledge theme, participants described their lack of understanding regarding shorebird management, conservation, and importance as well as education recommendations. The final theme, inconvenience/self-interest, participants described the human nature of people and wanting to decrease shorebird management practices.

Lack of knowledge

Participants expressed that it was the communities' role to be educated about shorebirds and to educate others, including residents, students, and those visiting the area. Participants mentioned wanting to know more about the agency's activities and recommended that signs be visible, educational, and placed in multiple locations. A few participants mentioned that it was the agency's role to enforce state and federal regulations, but lacked information and recommend that the signage be improved by taking old signs down and keeping others updated with the latest information concerning shorebirds and their habitats. Additionally, participants suggested that enforcement of the rules and regulations described by the signage be improved. Participants also recommended adding flyers or using newer technology (e.g., websites and QR codes) to educate the public.

Inconvenience/self-interest

Participants mentioned that the U.S. Fish and Wildlife Service was going "overboard with protection," and stated only areas needing protection should be closed. Other participants mentioned that the current closures were fine or that too many areas were closed. A few participants mentioned that they would like to have a say in closures in public forums like city council meetings.

Co-existence

Participants mentioned that all community members should be aware and adhere to rules and regulations regarding beach closures. Participants stated that citizens should act as volunteers by educating others and roping off closure areas. Additionally, participants supported limiting the usage of areas through closures, but needed a balance of protection and public use of ecosystems.

We did have some item non – response in our quantitative questions wherein eleven participant completed the open-ended questions, but chose not to complete the Likert scaled questions. Forty-five percent of the participants had no opinion regarding the role the U.S. Fish and Wildlife Service had in managing shorebirds, while 27% of the participants agreed they knew the role (Figure 3.1). Additionally, 49% of the participants had no opinion about the U.S. Fish and Wildlife Services', while 41% of the participants agreed the image was positive (see Figure 3.4). Fifty-seven percent of participants agreed that current signage and information is effective (regarding shorebird management and the role of management agencies), while 20% of participants "disagree" (Figure 3.2). Over half of the participants (58%) agreed that more beaches should be protected for shorebirds, while 23% of participants had no opinion (Figure 3.3).

Chi-square tests indicated that there are correlations between two sets of questions and statements. The first set of correlations evaluated the question, "Do you know the role the U.S. Fish and Wildlife Service has in managing shorebirds (Q1)" and the statement, "Current signage and information is effective (Q2)" ($X2=12.269$, $P<.0155$). An "agree" on Q1 led to a .7308 probability of an agreement on Q2 and an "agree" on Q2

Figure 3.1 Distribution table of how respondents responded to the question, "Do you know the role the USFWS has in managing shorebirds?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.

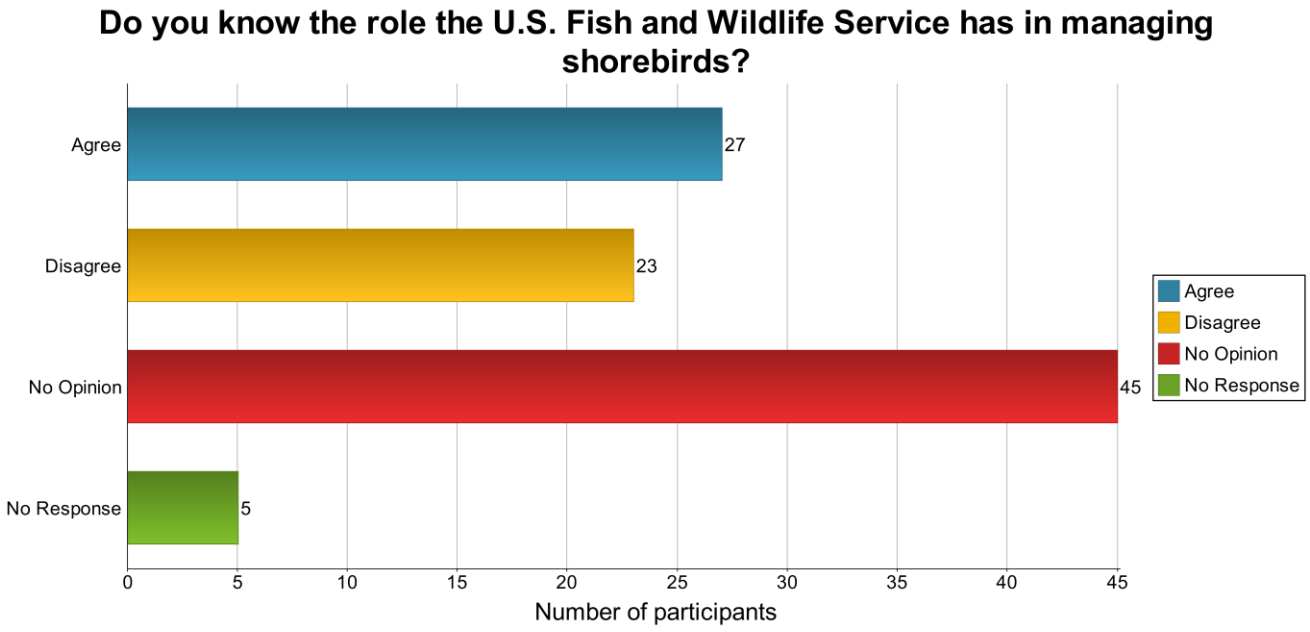


Figure 3.2 Distribution table of how respondents responded to the statement, "Current signage and information is effective." On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.

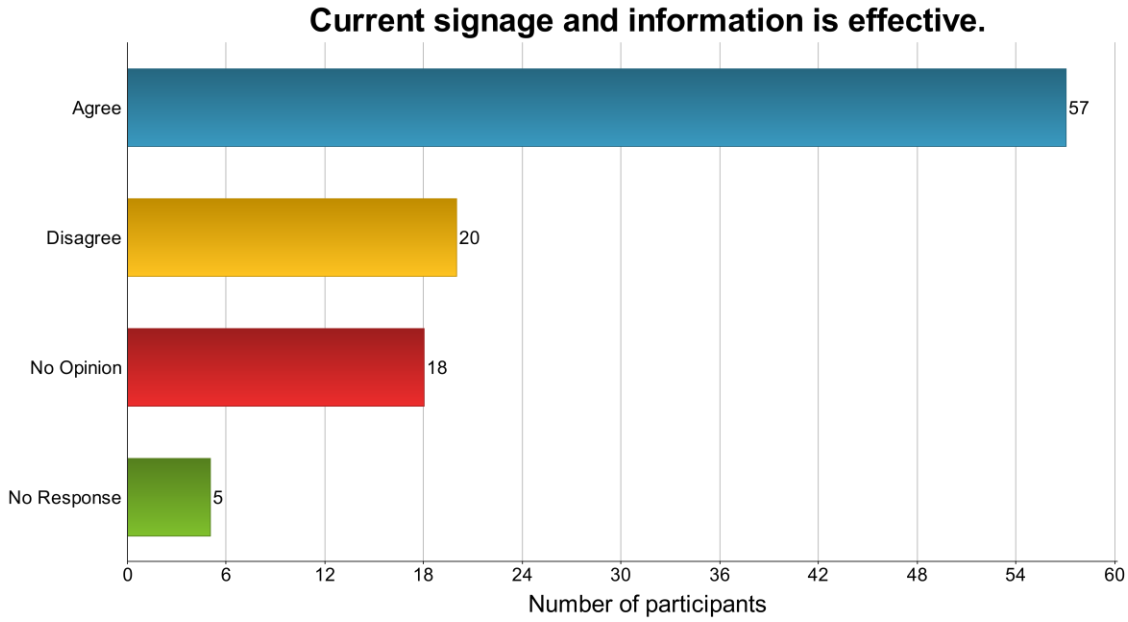


Figure 3.3 Distribution table of how respondents responded to the question, "Should more beaches be protected for shorebirds?" On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question

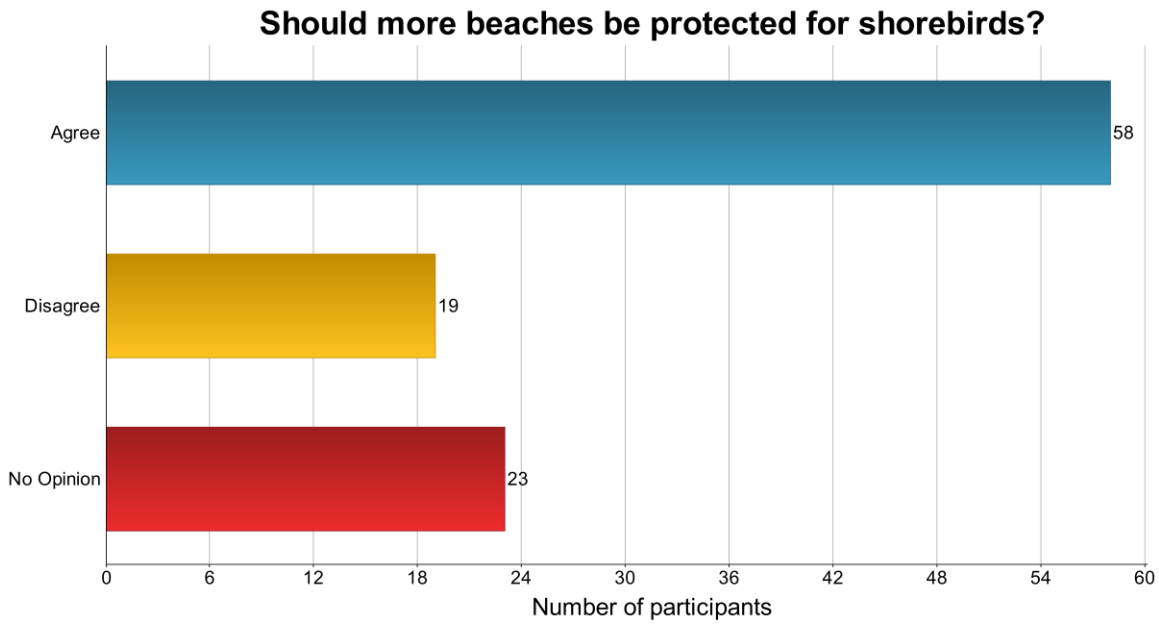
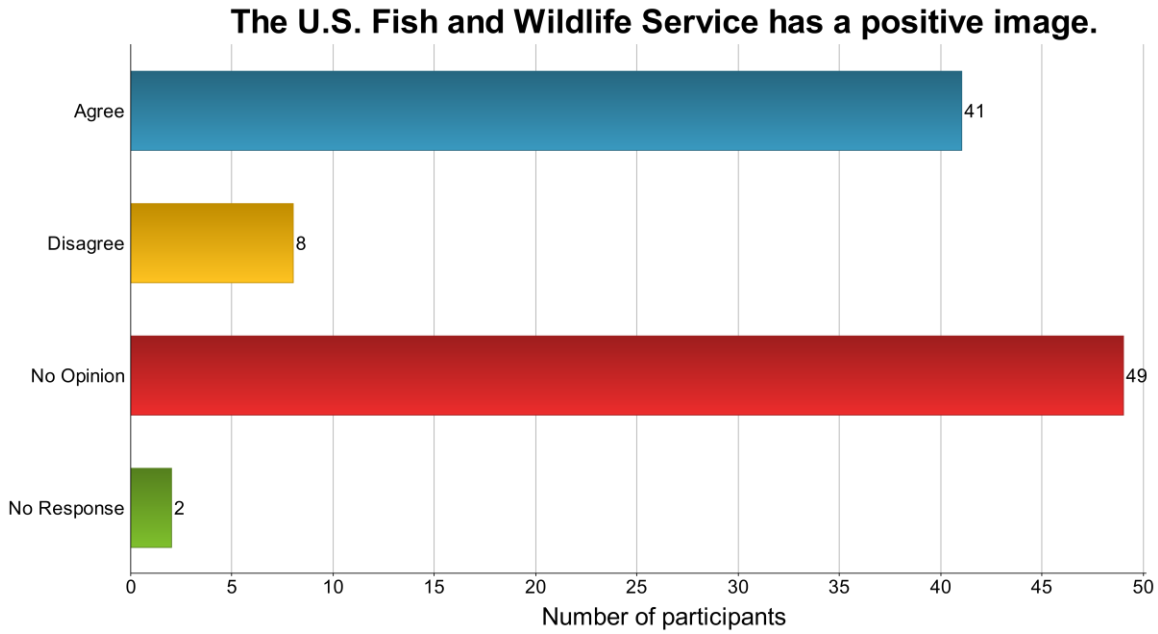


Figure 3.4 Distribution table of how respondents responded to the statement, "The U.S. Fish and Wildlife Service has a positive image." On the x axis is the number of respondents and on the y axis is the response option to the Likert scaled question.



led to a .3455 probability of an agreement on Q1 (Table 3.1). The second set of correlations evaluated the question, "Should more beaches be protected for shorebirds (Q3)" and the statement, "The U.S. Fish and Wildlife Service has a positive image (Q4)" ($X2=13.718$, $P<.0083$). An "agree" on Q4 led to a .6341 probability of an agreement on Q3 and a "disagree" on Q4 led to a .7500 probability of a disagreement on Q3 (Table 3.2).

The quantitative results show that almost half of the respondents had no opinion regarding the image of the U.S. Fish and Wildlife Service and their role in managing shorebirds on Cape Cod. Furthermore, over half of the participants agreed that current signage and information was effective. The results displayed a significant relationship between knowing the role of the U.S. Fish and Wildlife Service and effectiveness of current signage and information. This relationship suggests that if beach-users know the role the agency has in managing shorebirds, there was a 73% probability that the beach-users are in agreement that the current signage and information are effective forms of communicating this role. Additionally, the results showed a significant relationship between the U.S. Fish and Wildlife Services' image and beach protection for shorebirds. This relationship suggests that the image of the management agency (U.S. Fish and Wildlife Service) has an effect on beach protection for shorebirds. If beach-users agree that the agency's image is positive, then there was a 63% probability that they will agree with beach protection for shorebirds. However if beach-users disagree that the agency's image is positive, then there was a 75% probability that they will not agree (e.g. adhere to rules and regulations) to beach protection for shorebirds. The qualitative results show

that there were three reoccurring themes regarding the management of beach nesting shorebirds and their habitats. These themes were: (1) a lack of public knowledge and education of shorebird management, protection, and importance (2) the need for coexistence for successful shorebird management, and (3) public inconvenience and self-interests regarding increased beach closures. The qualitative data also showed that current signage and information is not effective and the public gave recommendations on how to improve the effectiveness.

CONCLUSIONS

In this study we identified through our qualitative findings that current signage and information are ineffective for managing shorebirds due to three attitudes: lack of knowledge and education, co-existence, and inconvenience/self-interest. In our quantitative findings we identified that current signage and information are an effective tool for managing shorebirds, even though participants had no opinion regarding the image of the U.S. Fish and Wildlife Service and their role in managing shorebirds. The findings within this study identified an obvious contradiction between the qualitative results and the quantitative results, which suggests that there are other factors involved in the effectiveness of signage as a tool for managing shorebirds. Garland (1991) suggests that mid-point ratings are the participants attempt to give a socially desirable response to a Likert-scaled question. The high percentage of "no opinions" in our findings alludes to a social desirable response among beach-users'. Therefore, the results of our study may be bias, because participants did not want to give their true opinions about the role and

Table 3.1 Chi-square analysis of beach users' responses to the role of USFWS and the effectiveness of current signage and information. The contingency table shows the probability of the respondent response to the given variables. Likelihood ratio was used for the analysis due to sample size.

Contingency Analysis of "Do you know the role the U.S. Fish and Wildlife Service has in managing shorebirds?" By "Current signage and information is effective."

Contingency Table

$Current signage and information is e	$Do you know the role the USFWS has in managing shorebirds?			
Count Total % Col % Row %	Agree	Disagree	No Opinion	
Agree	19 20.88 73.08 34.55	13 14.29 59.09 23.64	23 25.27 53.49 41.82	55 60.44
Disagree	7 7.69 26.92 35.00	4 4.40 18.18 20.00	9 9.89 20.93 45.00	20 21.98
No Opinion	0 0.00 0.00 0.00	5 5.49 22.73 31.25	11 12.09 25.58 68.75	16 17.58
	26 28.57	22 24.18	43 47.25	91

Tests

N	DF	-LogLike	RSquare (U)
91	4	6.1344324	0.0639

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	12.269	0.0155*
Pearson	7.960	0.0931

Table 3.2 Chi-square analysis of beach users' responses to beach protection and the U.S. Fish and Wildlife Service image. The contingency table shows the probability of the respondent response to the given variables. Likelihood ratio was used for the analysis due to sample size.

Contingency Analysis of "Should more beaches be protected for shorebirds?" By "The U.S. Fish and Wildlife Service has a positive image."

Contingency Table

$The USFWS has a positive image	$Should more beaches be protected for...			
	Count Total % Col % Row %	Agree	Disagree	No Opinion	
	Agree	26 26.53 46.43 63.41	6 6.12 31.58 14.63	9 9.18 39.13 21.95	41 41.84
	Disagree	1 1.02 1.79 12.50	6 6.12 31.58 75.00	1 1.02 4.35 12.50	8 8.16
	No Opinion	29 29.59 51.79 59.18	7 7.14 36.84 14.29	13 13.27 56.52 26.53	49 50.00
		56 57.14	19 19.39	23 23.47	98

Tests

N	DF	-LogLike	RSquare (U)
98	4	6.8591656	0.0716

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	13.718	0.0083*
Pearson	17.652	0.0014*

image of the U.S. Fish and Wildlife Service. Additionally, the high percentage of "no opinions" within our quantitative results, could suggest that the participants distrust government agencies. Davenport et. al (2007) found that local communities have a distrust towards government entities, which influences the communities willingness to trust management actions. This distrust within the local community on Cape Cod could be related to the U.S. Fish and Wildlife Service's mismanagement practices in 1996, which had a direct impact on shorebird conservation and management. Although this incident was not identified in this study, this particular event was a public relations nightmare and is an embedded piece of history on Cape Cod.

The contradictions in our findings could also be explained through Kellert's typology of nine values toward wildlife and the natural world. This typology describes values and meanings individuals attach to the environment (Kellert, 1984). The identification of inconvenience/self-interest in our qualitative data suggests that participants have personal values attached to the beach. Therefore it is important for management agencies to understand there are varying reasons why people come to the beach, other than for recreational purposes. Individuals come to the beach to find an escape or restorative experience. The experience can be a restful, reflective, and healing and therefore the beach becomes a significant and integral piece of the community (Kaplan, 1992). Negative signage decreases the compatibility of the restorative environment experience because it causes an effect on how individuals can function on the beach (Kaplan, 1992). The dichotomy we have uncovered would suggest that current

signage and information is effective act communicating past management practices, but ineffective at communicating the value and relationship people have with the beach.

Considering the amount of visitors to the beach, many of these users are engaging with the environment around them whether it is coming to the beach to bird, walking along trails, or simply to recreate on the coastline. Despite the connection to the environment, beach users are engaging in behaviors that are detrimental to beach habitat and management of shorebirds. Likewise the signage used to communicate these management practices is ineffective at educating the public on responsible behavior. Therefore a potential exists to increase beach users' enjoyment and understanding while prompting environmentally responsible behavior. It is important to develop an education program that deliberately sets out to change beach users' attitudes and behavior. This could be achieved if there is open communication between the local community and the management agency. Management agencies usually fall short of communicating the intent of management practices due to focusing on conserving the species at risk. However, social support is key in the recovery of threatened and endangered species. For example, the "be a good egg" campaign developed by North Carolina Audubon utilizes public education, social marketing, and citizen science to protect BNS by incorporating a unified (management agencies and community) focus on preserving the habitat and the birds so everyone can use the beach. This campaign also uses school outreach programs to design a "user friendly" sign. These signs are designed to inspire awareness of protecting BNS without excluding beach – users. Many of the signs that are displayed on the beaches of Cape Cod are exclusive of the community (i.e. "Keep Out", "Do Not

Enter"). Although research was not conducted on what type of signage beach users on Cape Cod would prefer, the efficacy of the "be a good egg" campaign would suggest that beach users would rather have a "user friendly" sign that is inclusive of the community. On the other hand, Martin (1992) suggested that using a combination of signage and brochures could help beach users to acquire information if one of the two communication tools were missed. Essentially, brochures could be an informal environmental educational program that confronts and corrects misconceptions, while signage could serve as the immediate interpretation of these programs by invoking emotional and intellectual curiosity (Bitgood, 2000; Tilden, 1957). Regardless of which type of program is implemented on Cape Cod the education program needs to create curiosity, should outline issues related to the community, provide opportunity for people to take action, and allow for feedback regarding management practices.

ACKNOWLEDGEMENTS

Funding for this project was provided by Clemson University and the State Doctoral Scholars Program. We would like to thank Dr. J. Drew Lanham (committee chair),Dr. Brad Andres, Dr. Betty Baldwin, Dr. Shari Rodriquez, and Dr. Greg Yarrow for providing guidance, research design, data analysis and encouragement. Additionally, we would like to the U.S. Fish and Wildlife Service (particularly, the Pathways Program and Monomoy National Wildlife Refuge) for providing opportunity to conduct this research. Furthermore we would like to thank Dr. Billy Bridges for providing quantitative data analysis.

CHAPTER FOUR

CONCLUSIONS

Management Implications

These results suggest that the lack of knowledge of shorebird management and protection, the need for coexistence for successful shorebird management, and inconvenience/self-interest regarding beach closures, combined with previous conservation and management history of the area have shaped social values of human – shorebird interactions on Cape Cod. Conservation often generates conflict because it challenges the values people have about the resource (Baldwin & Judd, 2010). People's perceptions are influenced by their past experiences, beliefs, and values.

Forty miles of Cape Cod, MA is protected within the Cape Cod National Seashore. This designation preserves the outer banks of Cape Cod, but also allows multiple uses within its governed boundaries. In 1968, Hardin drew attention to how human consumption and extraction of natural resources within a common resource would ultimately degrade that resource in an essay titled "Tragedy of the Commons" (Hardin, 1968). Hardin's essay broadly looked at the overpopulation within a common resource and discussed a framework on how best to avoid the dilemma of the "Tragedy of the Commons" (TOC). The commons literature of today takes into consideration the importance of perception within the shared resource, by suggesting that individuals have problems understanding how their actions directly affect the degradation of the resource due to the obscurity and global scale of environmental issues (Burke, 2001; Steins & Edwards, 1999; Uphoff & Langholz, 1998). On the other hand, there are town owned

beaches and federal refuges on Cape Cod that restrict access and multiple recreational uses. Yet conservation challenges and conflicts regarding shorebird management and conservation are prevalent within all of these areas. With a variety of stakeholders involved with the management and conservation of shorebirds, who all have their own goals and strategies of shorebird conservation and management, a collective identity could raise support for conservation and management of shorebirds. Therefore it is important for management agencies to foster a group identity that is inclusive of the community. A group identity could be fostered through educational programs that are focused on healthy beach ecosystems. This type of educational programming can provide opportunities to educate the public on the importance of shorebird species, increase awareness of a healthy beach system, and address recreational behaviors and uses that are detrimental to shorebird populations and public safety. Initial educational outreach target audience should be year –round residents, due to their investment in the well – being of the community. Although we did not report any results regarding the effect of residency on shorebird conservation and management, we did look into how residency correlated to beach closures for shorebird protection. What we found is that residency has an effect on the relationship of closure and protection (or you could say that residence interacts with closure and protection). For some residency groups (Cape Cod and Massachusetts residents) there appears to be a relationship of closure and protection. For other residency groups (out of state) there does not appear to be a relationship of closure and protection. Based on these limited results, it is important for

management agencies to develop conservation strategies that initially address local issues of shorebird protection and management.

Furthermore, there needs to be an awareness of the importance and heritage of these protected areas on Cape Cod. Henry David Thoreau's "Cape Cod" (1987) highlights not only the beauty and pristine beaches of Cape Cod, but also dwells on the importance of the shorebird (i.e., Piping Plovers) that makes the soundscapes of Cape Cod. Many Cape "Codders" take pride in their community and the townships boast about how their local beaches are the best; there is potential to add to the rivalry by awarding the best habitat, township support, and conservation efforts for beach nesting shorebirds. An awareness campaign (i.e. ALS ice bucket challenge) that encourages friendly competition within the community could promote a stronger coexistence and limit the inconvenience/self-interest of beach-users due to temporary beach closures. The ALS (Amyotrophic lateral sclerosis) ice bucket challenge was a social media campaign used to raise awareness about ALS and monetary donations for research. This campaign served as an example of the many avenues social media can provide.

With more than 80% of respondents (see Appendix C) between the age range of 22-55 years old opportunities are being missed to engage these individuals through the use of social media and educating them regarding shorebird conservation and management. For instance if social media (i.e. Instagram, Twitter, Facebook) was used to track those species that are nesting on Cape Cod and challenge beach users to help manage their breeding habitat there is a possibility to encourage beach users to become shorebird volunteers and possibly citizen scientist who are helping to conserve BNS.

Moreover, this type of local campaign could draw national attention and support for the protection of wintering and stopover sites along the Atlantic Flyway through the use of social media also and word-of-mouth.

The results also show that participants had some connection to the beach and have beach traditions, locations, and memories that may have pre-dated shorebird management on Cape Cod. The inconvenience/self-interest identified among the participants of this research suggests that place attachment can have an effect on the conservation and management of shorebirds. Places are important in developing and maintaining identity (self and group) and human behavior is a difficult task to understand because there are many influences on behavior. Visitors to Cape Cod beaches react negatively to management practices because they feel their identity is being taken away from them. The communication lines are poor between visitors and management agencies. Therefore the visitor lacks understanding of the rationale of the management agencies. On the other hand, management practices have symbolically, severed bonds between people and nature and without a place to fulfill this attachment then the conflict will always exist.

Place attachment (bonding) occurs as people develop affective feelings towards resource settings. At times these feelings can develop into a sense of belonging, identity, dependence, and even possessiveness towards places (Korpela, Hartig, Kaiser, & Fuhrer, 2001). Likewise place attachment is a developmental process that occurs overtime and with experience (Hammitt, Backlund, & Bixler, 2006). It is common for individuals to develop possessive feelings towards a resource and these places become an avenue for many types of leisure activity (positive and/or negative). Lynn and Brown (2003),

findings supported the assumption that recreational use impacts might have the potential to negatively affect the quality of the visitor experience. Connections to special places incorporate sentiments that go beyond value judgments based purely on the utility of these areas for activities (Eisenhauer, Krannich, & Blahna, 2000).

Moreover place attachment involves strong emotional ties which could cause an individual to believe the resource is theirs and therefore disregard impacts due to the individuals self – interest. This type of identity not only helps to understand the connection between self and the physical environment, but also the amount of knowledge, behaviors, and expectations one has within a given environment. Place attachment (sense of place) reaches far beyond emotional attachment and is concerned with the symbolic connection to the environment.

Research Limitations

There are myriad potential limitations of this research and its implications for future research. First, there is limited research on social perceptions of beach nesting shorebirds, and this study only assessed a small population that lives in or vacations to the Cape Cod area. The small sample size limited our quantitative analysis as we began to break apart the demographic information that was collected. More research should be conducted on the values of the participants and how this affects shorebird conservation and habitat management on Cape Cod. Further research should be conducted throughout the townships of Cape Cod to see if valuation changes which would help to further analyze the demographic information collected in this research. Second, the duration of

our survey (May-September) might have brought extra attention to an issue that was already affecting the perceptions and attitudes of beach-users. Surveys should be conducted outside of the breeding season to understand if perceptions and attitudes of beach users' change as beach restrictions are reduced. Also surveys should be conducted to see if differences exist between perceptions and attitudes on private shorelines versus public beach access.

Finally, social desirability is very evident throughout this research and respondents could have biased their answers in fear of losing access to beaches. Limited information was gathered about the participants of this study. This study allowed for the respondents to remain anonymous, but based on the results participants biased their responses. If surveys were restructured to understand socioeconomic status and how that related to regulatory actions this could help to develop socially acceptable management objectives. The contradiction between the qualitative data and the quantitative data was an unexpected discovery and something that should be further analyzed. If surveys were changed to understand how place attachment influences beach users behaviors and/or actions this could help understand why the contradiction exists in this research. Perhaps a sequential mixed methods study would allow for a better interaction between the data sets to develop a richer understanding of the participants, place attachments, perceptions, and attitudes that derive from the research question(s). Experimental design could be changed to allow for focus groups and/or key informant interviews to develop a rapport between the researcher and the participants which could help to decrease bias and clarify inconsistencies in the data.

The scope of the research should be broader to get a better overview of the perceptions and attitudes of shorebird management along the western Atlantic Flyway and those issues that hinder conservation and management of shorebirds. It is important to note that the Cape Cod community is just as dynamic as the shorelines to which they venture. This research used a concurrent, mixed-methods approach to gain an understanding of the perceptions of beach goers during the summer months of 2012. Therefore, it is important to understand that individuals are influenced by their experiences, and these experiences will vary. As a result, the findings in these studies represent experiences that where influenced during the 2012, and previous breeding seasons. Subsequent research needs to be conducted to see if the perceptions and attitudes of beach users are similar to 2012. Any management practice or campaign to conserve beach nesting shorebirds will need to be an ongoing effort. Because there are varied numbers of municipalities involved with the conservation and management of shorebirds, these agencies need to be willing to work with each other by discussing management options and practices that have been successful or unsuccessful. These types of collaborations could help to improve upon conservation and management of shorebirds while also identifying knowledge gaps. A collaboration of agencies at the National Conservation Training Center succeeded in identifying a lack of knowledge on social values of the public regarding protection of shorebirds and the coastal habitat on Cape Cod. The studies in this dissertation began addressing these knowledge gaps and could add knowledge to the conservation and management of shorebirds within the United States by understanding the perceptions that influence social support.

Additionally, this dissertation is an example of the importance of agency collaboration and gives credit to the outcomes of those collaborations. Nonetheless, conservation will continue to be a community endeavor that conserves wildlife with the public's support.

APPENDICES

Appendix A

Questionnaire to survey beach users on Cape Cod

Initials and age only _____

Marla Hamilton
Clemson University
Clemson, SC 29632
864-656-0000

Please take a few minutes to fill out this survey on shorebird management on Cape Cod, MA. Clemson University thanks you for your feedback and your answers. Your participation is greatly appreciated.

General Information

What is your age range?

○ 21 and under ○ 22 - 35 ○ 36 -45 ○ 46 -55 ○ 55 - over

What is your income range?

○ < 24,000 ○ 25,000 to 49,999 ○ 50,000 to 74,999 ○ 75,000 to 99,999 ○ >100,000

Highest level of education completed?

○ High school ○ GED ○ Bachelor's Degree ○ Advanced Degree ○ Other

You are a resident of?_____

Beach Use

How often do you visit the beach?

○ All the time ○ occasionally ○ Some what ○ rarely ○ Never

I view the beach as a habitat for wildlife?

○ Strongly Agree ○ Agree ○ No Opinion ○ Disagree ○ Strongly Disagree

Wrack is the seaweed that is placed on the beach by waves. Wrack is used as nesting habitat and a food source for protected shorebirds. Wrack is often removed from beaches to help them appear cleaner for tourists. Wrack should be protected as a habitat?

○ Strongly Agree ○ Agree ○ No Opinion ○ Disagree ○ Strongly Disagree

Page 1 of 6

Initials and age only _____

Marla Hamilton
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How is the beach a part of your life?

_____
_____
_____
_____
_____
_____
_____
_____

Shorebirds

Do you watch shorebirds?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Do you have a favorite shorebird?_____

Shorebirds are important to protect?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Should more beaches be protected for shorebirds?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Should there be information about where shorebirds are nesting on Cape Cod?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Please explain your answer to question number three of this section?

_____
_____
_____

Initials and age only _____

Marla Hamilton
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_____
_____
_____
_____
_____

Management

Shorebirds are a migratory species and are managed state and federally. Do you know the role the USFWS has in managing shorebirds?

○	○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Strongly Agree

What do you understand as the job of the USFWS?

_____
_____
_____
_____
_____
_____
_____
_____

The USFWS has a positive image?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

How do you feel about beach closures for shorebird nesting?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Humans and Shorebirds can coexist?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Initials and age only _____

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There should be fines for people that ignore signs?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Should other wildlife be euthanized to protect shorebirds?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Why do you think there is often a lack of public support of closures in protected areas for shorebirds?

_____
_____
_____
_____
_____
_____
_____
_____

Community

There are federally listed threatened and endangered shorebirds on cape cod. What role should the community take part of in protecting shorebird habitat.

_____
_____
_____
_____
_____
_____
_____
_____

Initials and age only _____

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Clemson, SC 29632
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The USFWS is charged with the task of protecting shorebird habitat and uses signs posted in nesting and breeding areas. The current signage and information is effective?

○	○	○	○	○
Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

What feedback would you give the agency regarding their signs and messages?

_____
_____
_____
_____
_____
_____
_____
_____

Do you have suggestions for management strategies?

_____
_____
_____
_____
_____
_____
_____
_____

Additional Feedback

Please share any additional comments.

_____
_____
_____
_____
_____
_____
_____
_____

Initials and age only _____

Marla Hamilton
Clemson University
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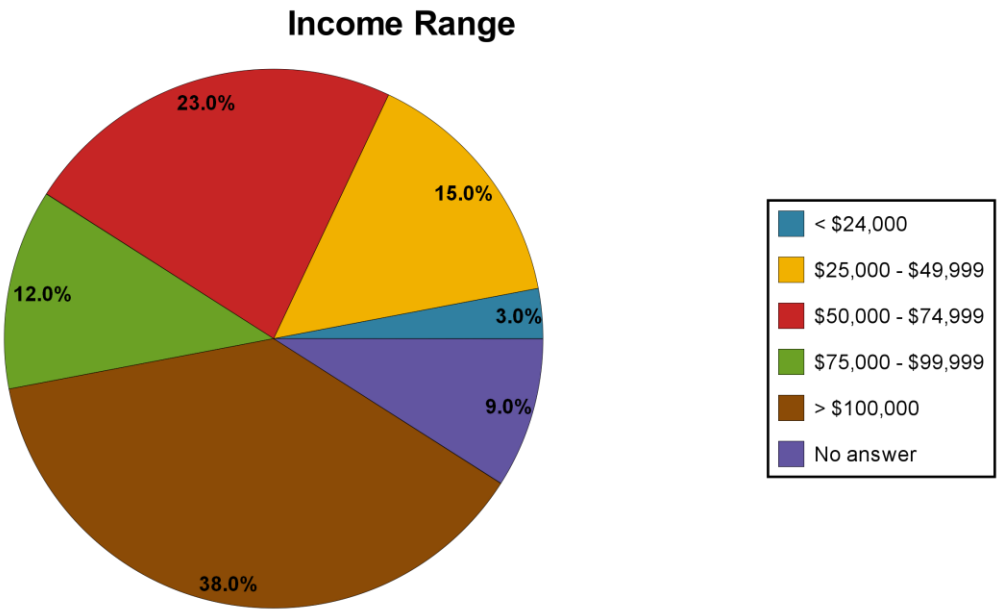
Thank you for taking the time to fill out our survey. Your feedback may help to improve shorebird management practices. Your input is greatly appreciated.

Appendix B

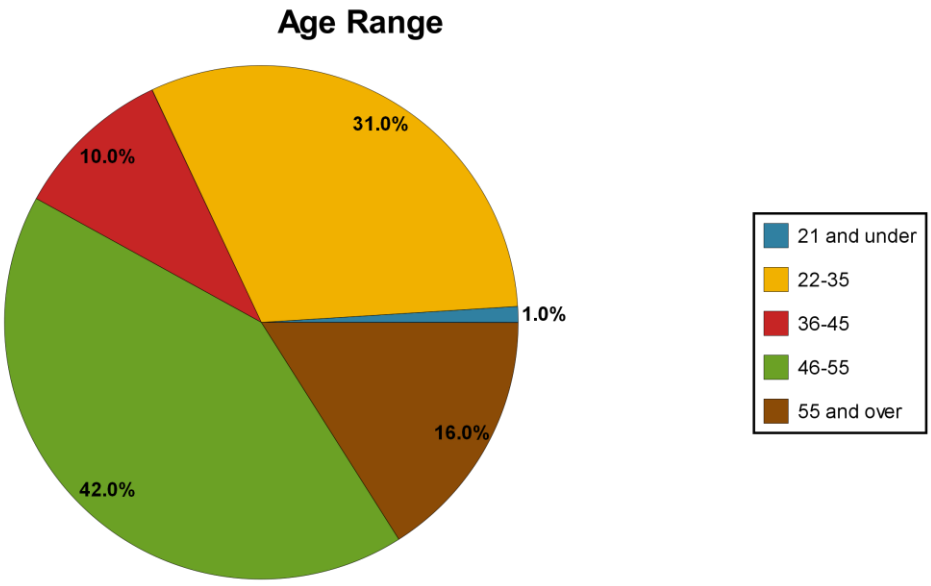
Pie chart of respondents' income range



Percentage of respondents income range

Appendix C

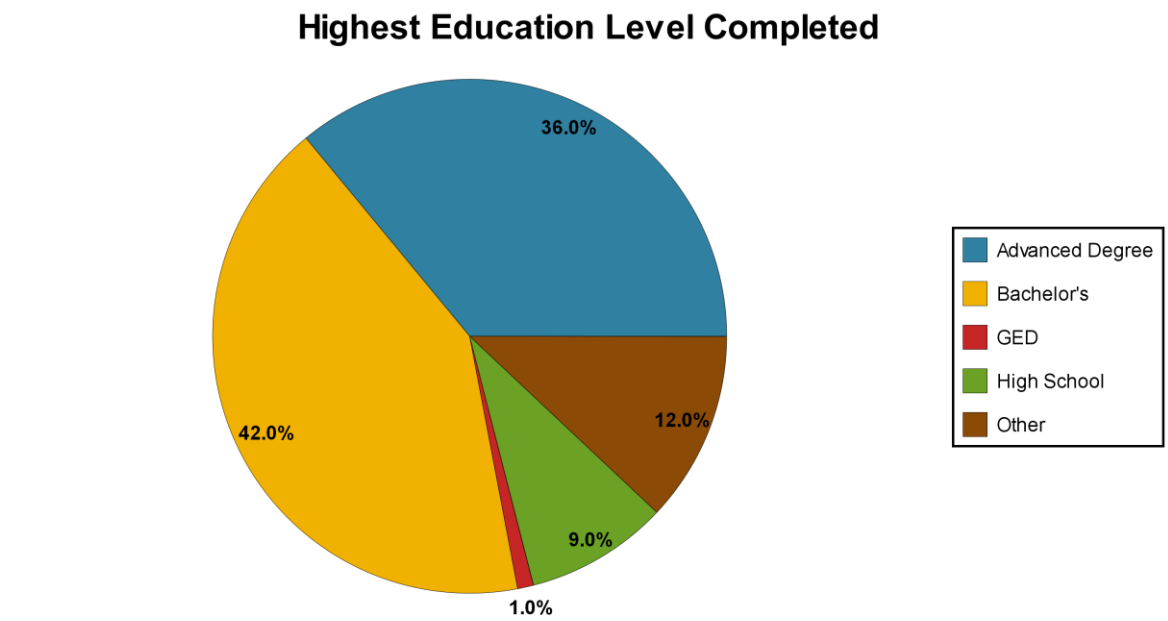
Pie chart of respondents' age ranges



Percentage of respondents age range

Appendix D

Pie chart of respondents' level of education completed



Appendix E

Beach users' responses to "How is the beach a part of your life?"

Subject	How is the beach a part of your life?
EL29	Place to spend time on weekends during the summer to relax and enjoy time with friends
JP37	N/A
KG54	Dog walking; sitting
RG52	Very important - bought property here to beach
RM47	I usually go off season as a part of a walk
DC52	Love living near the beach - lots of walking vs. swimming, out it is a centering force when I'm stressed or upset, or just want to relax
RR38	The beach for me is where the beginning and end meet. It is a place of contemplation and an appreciation of everything that is beautiful in the world
TF55	N/A
DP30	We visit the beach several times per week in the summer
TB24	I go at least once a week I also have an off - road vehicle permit for Sandy Neck Beach
RC30	Summertime Visits
MF55	Family, Fun, peacefulness
RC27	Leisure - downtime, swimming
LG32	Swim, walk, enjoy the view
MG32	Recreation
PG33	N/A
MR65	A huge part is we enjoy congregating with beach friends
SK62	Sun - Friendship gathering; Built a home here 30 yes age because of the beach
FP30	N/A
EM51	Relaxation
SP47	N/A
JM50	Vacations
MM34	N/A
HD37	Primarily for recreation and exercise
JP33	We camp here on a weekly basis
MG28	I enjoy my free time here as a second home
FC55	Love the nature peaceful beautiful scenery
GJ55	N/A
MN46	Campfires on weekend in summers as a family for years
EM35	Bring my son to swim
KP35	I spent a lot of time on the beach in the summer and own an RV I use to camp on sandy neck

DC52-B	We camp at Sandyneck
MS35	We camp here
AW30	We enjoy visiting the beach as often as we can for sitting, swimming, walking and enjoying the sea life too (finding seashells, crabs, etc)
CC56	N/A
JM33	It is a tranquil way to relax and enjoy nature like a forest or dune
JW55	Large part - camp all summer
JG46	Stay with family most weekends visit all year long
NI46	Swimming almost every day Camping on Beach in motor home every weekend
VH35	It's part of our daily life
DH54	Sunning, family
SH26	Recreational purposes - drinking, swimming, socializing
CH24	Recreational purposes: socializing (entertaining) vacation
BH18	N/A
BM58	I live here and walk here everyday
MS44	Family, fun, picnics, and fishing
JM50	Walking, running, picnics, relaxing, snoozing, family time
SL46	N/A
LJ47	Enjoyment, swimming
KZ47	Summer vacation every year since a child
TH46	Grew up on the beach, vacation etc.
JP48	Love it when I can get here, love taking pics of wildlife actions
NI46	Summer vacation
MB53	Enjoyment
EI29	For recreation
MH27	Sun, fun, see friends, swimming, relaxing
JP52	I grew up on the shore and enjoy it recreationally
CP54	A place to go to connect with nature
MD48	I enjoy sitting on the beach for relaxation as well as walking the beach
NI55	N/A
AW30	family spends a lot of days = early summer to late fall - swimming, running. A huge part of our lives
JG32	Big part. Swimming and sailing
DW33	summer family time
DM31	casual activity
NW65	a place to relax and enjoy the water
DW66	We visit the beach by car and boat. We also watch the beach year round as it changes
DD47	N/A
DP41	Visit it every weekend in the summer

JC54	Grew up spending time at the beaches in RI and Mass. Every weekend and vacations
JC56	walk/sunbath
AL52	I work at the Chatham beach and tennis club. I spend a fair amount of time at the beach in the summer
AH32	We spend time with friends to relax on the weekends. We relax by walking down the beach and looking at tidal pools (at Monomoy)
ET56	It is part of my everyday experiences in life
LT66	Beauty and recreation
SL50	spending time with friends and walks
LJ59	use as recreation and relaxation
GE31	N/A
LW51	Recreation/surfing
SC47	I rarely go although I live 3/4 mile to beach
FC41	Summer life. I enjoy all aspects
PG49	I walk my dogs
LA45	To view nature and wildlife
NI46	I learned to swim on the beaches of Brittney in France as a 6 yr. old. I regularly visit the beaches in Italy with my family and of course the beaches on cape cod this year
LC36	walking - exercises family time - picnic, surfing
JR42	visit it every summer - national seashore enjoy recreation and beauty
MM42	Spent every summer of my life on Cape Cod go to the beach every day in the summer
LR40	Live on the cape each summer and spend most days on the beach - boogie boarding surfing, etc.
KC49	enjoy outdoors, water/ocean with family and friends own children grew up summers on cape learning about natural beauty/habitats for wildlife on cape cod beaches
JR46	surfer/fisherman
KF49	I spend a good part of my summers on the beach I value the beauty of the cape cod national seashore
JM57	Essential to my physical and mental wealth - I visit as often as possible
JD54	Rejuvenating
DH48	Love to visit, grew up here and feel lucky to live so close to the ocean
NB23	Vacation get away. Place to relax
JR30	n/a
CS23	I have a summer place on the beach so I like to visit as often as I can
MS56	To relax and swim. Not for commercializing
CS23	I go to the beach frequently during the summer to spend time with family and friends as well as to relax
DS53	Enjoyment

KM53	relaxation, stress relief, exercise

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